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AN IMPROVED VACCINE FOR IMMUNIZATION AGAINST RINDERPEST[1]

By R. A. KELSER

Major, Veterinary Corps, United States Army, and member of the United States Army Medical Department Research Board
Manila

WITH THE COLLABORATION OF

STANTON YOUNGBERG and TEODULO TOPACIO

Of the Bureau of Agriculture, Manila

FOUR TEXT FIGURES

In the Philippine Islands agriculture constitutes the very backbone of the country's resources. Thus, any factor that impedes or in any way interferes with agricultural development, to an equivalent extent, hinders the economic development of the Islands generally.

In his agricultural pursuits the Filipino farmer finds the carabao (water buffalo) an indispensible factor. Take away his carabao and his ability to work his rice paddies and sugarcane fields, and transport his products is seriously interferred with. Thus, in the present order of things in the Philippines the carabao is a real necessity, and any agent or condition that threatens the well-being of this animal is a serious menace to agriculture.

While quite resistant to many of the ailments of the lower animals, the carabao is highly susceptible to rinderpest, an acute, febrile, contagious disease, caused by an ultramicroscopic, filterable virus. The mortality rate is exceedingly high, the disease proving fatal in a high percentage of cases. Thus, rinderpest has proven a serious menace to the common type of work animal employed in the promotion of agriculture in the Philippines.

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Cattle are likewise very susceptible to rinderpest and readily succumb to its ravages. The disease has proven by far the biggest obstacle in the development of cattle raising and dairying in the Philippines.

It is believed that rinderpest was first introduced into the Philippine Islands in 1886 or 1887, presumably from Indo-China. It has since spread to various islands of the Archipelago and to date has taken a toll in animal lives amounting to hundreds of thousands. According to figures compiled by the Philippine Bureau of Agriculture, over 180,000 deaths from rinderpest were officially reported during the ten years preceding 1927. This figure represents actually reported deaths from the disease. Obviously, some cases occur that are not reported, so in reality the loss has, without doubt, been greater than that indicated.

Figures on the animal population of the Philippines indicate that in 1926 there were 1,824,842 carabaos and 1,021,169 cattle in the Islands. During the ten years ending with 1926 (the last year for which we have figures) the average annual increase in carabaos and cattle was approximately 97,500 animals. The average annual loss from rinderpest during the same period was approximately 18,000 animals. Thus, the average annual death rate from rinderpest during the years 1917 to 1926, inclusive, was more than 18 per cent of the average annual increase in carabaos and cattle.

The seriousness of rinderpest in the Philippine Islands is thus very apparent. The problem has been recognized by all students of economic conditions in the Islands; and, as the late Governor-General Wood stated, in certain sections of the Philippines it destroys so many animals as to interfere seriously with the economic development of the people.

In countries where rinderpest has been a problem a vast amount of work has been done with a view to finding a cure for the disease or a satisfactory means of immunizing susceptible animals against it.

Following reports that the Boers had, for a long time, obtained good results with bile in immunizing animals in the Transvaal against rinderpest, Koch,(1) in 1897, investigated their claims. He found that when bile from cattle dead of rinderpest was administered in rather large amounts to susceptible animals it afforded them considerable protection against subsequent infection. Koch's observations were soon confirmed by Kohlstock,(2) Kolle,(3) Theiler,(4) Turner,(5) and a number of others.

Edington(6) recommended the addition of 1 part of glycerin to 2 parts of bile when using the latter for immunization purposes. Then, in order to produce a more substantial immunity, Kohlstock(7) recommended giving animals that had received the bile treatment 0.20 cubic centimeter of virulent blood about two weeks subsequent to the injection of bile.

The bile, and bile and virulent blood method of immunization against rinderpest have been used on a rather large scale and up to the time better methods were developed they served a useful purpose.

In 1893 Semmer(8) reported that the blood of animals that had recovered from rinderpest possessed considerable merit as an immunizing agent. This finding was not taken advantage of on any appreciable scale until some years afterwards. However, the observation was later confirmed by several investigators. Further, it was demonstrated that a more-potent serum could be produced by administering increasing amounts of virulent blood to immune animals used for serum production. Thus, the use of antirinderpest serum became an important factor in the treatment and prevention of the disease.

In the treatment of rinderpest it was soon found that in order to obtain favorable results with serum it must be administered very early in the disease and be given in relatively large amounts.

As an immunizing agent it was found that, as with most serums, the immunity conferred is of short duration. This led Kolle and Turner(9) and several others to introduce the simultaneous method of immunization. In this method susceptible animals are given an injection of antirinderpest serum, the administration of the serum being immediately followed by an injection of 1 or 2 cubic centimeters of virulent blood.

The simultaneous method of immunization against rinderpest has, without question, been of great value in controlling the disease. It has, however, several distinct shortcomings. In the first place, a certain percentage of animals receiving this treatment develop severe reactions and some losses from rinderpest occur as a direct result of vaccination. Then, reacting animals are readily capable of spreading rinderpest to susceptible animals if contact is afforded, hence this feature must always be given due consideration when the simultaneous method of immunization is contemplated.

In 1916 and 1917 Boynton,(10) working with rinderpest in the Philippines, carried out a series of experiments to determine the infectiousness of various tissues from animals dead of rinderpest. Among the experimental animals used in connection with this work he had several head of cattle which had been injected with tissue preparations in which the virus had either died out or had become reduced in virulence to the point where it would not produce disease. On subsequently inoculating these animals with virulent blood, Boynton found that they resisted the infection with little or no reaction. This finding immediately suggested the possibility of a vaccine, prepared from the various tissues, as a satisfactory means of immunizing cattle and carabaos against rinderpest.

For some years following this observation Boynton devoted his time to the development of such an immunizing agent and finally succeeded in producing a vaccine of considerable merit. In 1920 the Government of the Philippine Islands put this vaccine into use on a large scale, and it has proved of great value in rinderpest control work in the Islands.

As prepared by the Philippine Bureau of Agriculture, Boynton's vaccine consisted of a heated, glycerinized and phenolized mixture of blood and finely ground tissues (spleen, liver, kidneys, lymph glands, heart, and testicles) taken from animals destroyed in the acute stages of rinderpest. The blood content made up from one-third to one-fourth of the bulk, and the proportion of phenolized glycerin added was equal to one-third the weight of the blood and tissue. The reaction of the glycerin used was about p_H 7.8. The mixture was heated for three hours in a water bath maintained at 42° C. For use this concentrated vaccine was diluted with a fluid consisting of $33\frac{1}{3}$ per cent glycerin in physiological saline solution.

Kakizaki(11) and his associates Nakanishi, Oizumi, and Nakamura, of the Institute for Veterinary Research of Chosen, Japan, have done a large amount of work with rinderpest vaccine and report excellent results in the control of the disease with vaccines prepared from various tissues of animals affected with rinderpest.

In his early work Kakizaki employed an emulsion of spleen tissue in which the virus had been killed by prolonged contact with glycerin. The handicap with this vaccine was the long period of time required for its preparation. Later this investigator and his associates used heat and such chemicals as phenol, toluol, alcohol, ether, iodine, and eucalyptol in their vaccine experiments. Of these agents eucalyptol and toluol gave encouraging results.

In the last report received, it is indicated that Kakizaki and his coworkers are destroying the rinderpest virus in their vaccine through the combined action of heat, glycerin, and toluol. Two to three parts of glycerin and 8 to 10 per cent toluol are added to the tissue mixture which is then incubated at 37.5° C. for seven to ten days.

While toluol is undoubtedly of value in preparing rinderpest vaccine, we have found that its use results in a very viscid preparation which offers considerable difficulty in administration. Further, absorption of toluolized vaccine is very slow.

In the Philippines the vaccine prepared according to Boynton's method has, without question, been of very definite value. However, there are several factors in connection with its production that have proved to be very serious. In the first place, after preparation the vaccine must be allowed to age at refrigerator temperature for a period varying from one to as much as six or seven months before it can be used without danger of producing rinderpest. Then after it has reached the point where it can be safely injected it must be used within a relatively short period of time as it loses its potency as an immunizing agent rather rapidly, in some instances in five or six weeks. Further, in a few instances, it has happened that after a lot of vaccine was held for a long period in order to be able to inject it with safety, it was found worthless for immunizing purposes.

The seriousness of these shortcomings is obvious. First, no appreciable surplus of vaccine, ready for use, can be maintained on hand because of its poor keeping qualities. Then, in the face of a serious outbreak of rinderpest it is impossible to quickly increase the vaccine output because of the long period of time required to properly age the product. Thus, it is obvious that before the effects of an increase in production can be realized an outbreak of the disease can have spent itself.

In February, 1926, the United States Army Medical Department Research Board, at the request of the late Governor-General Wood and the Bureau of Agriculture, undertook a study of the rinderpest vaccine prepared by the Bureau of Agriculture with a view to improving it. As a result of this investigation, the board, working in coöperation with the Bureau of Agriculture, has been able to produce a highly potent rinderpest vaccine which can be safely used within a few hours after preparation. Immunization experiments carried out with a large number of cattle and carabaos have fully established the value of this vaccine. While more time will be required to determine the maximum period of time this vaccine will keep, we have thus far demonstrated that it retains its potency for at least a year. Several preliminary reports(12) on this work have already been published.

VACCINE PREPARED BY THE MEDICAL DEPARTMENT RESEARCH BOARD

During the first few months of our investigations various attempts were made to develop a means by which we could promptly destroy the rinderpest virus in tissue and blood mixtures without injuring the material as an immunizing agent. This work involved the use of varying degrees of heat, and the use of such chemicals as glycerin, toluol, phenol, and finally chloroform. In our early endeavors, in addition to work with mixtures of tissues and blood, we tried to develop filtrates of tissue extracts and also precipitates that could be used as immunizing agents. The result of such efforts were all more or less unsatisfactory until we developed our chloroform-treated vaccine. We found that when chloroform was added, in proper proportion, to a mixture of blood and finely ground tissues from an animal killed in the acute stages of rinderpest, the virus was promptly destroyed. It was further ascertained that such mixture could then be safely used as an immunizing agent with excellent results.

Our next step was to determine whether or not all of the tissue constituents entering into the preparation of the vaccine were of value. Work along this line definitely demonstrated that the blood constituent was of no value as an immunizing agent. It was thus obvious that vaccines containing blood were diluted with an inert agent which, because of its nature, detracted very materially from the keeping qualities of the vaccine. In so far as the various tissues are concerned, it was found that vaccines prepared from the lymph glands, spleen, liver, and from a mixture of kidney and testicular tissues, respectively, were all effective as immunizing agents. As a result of these findings the blood was omitted in the preparation of our vaccine.

We found that the mesenteric glands frequently contained pathogenic, spore-bearing organisms (*Clostridium oedematis-*

maligni, C. tetani, etc.). In order to eliminate possible trouble from such source the mesenteric glands were omitted in the preparation of our vaccine.

After discarding the blood as a constituent of the vaccine its consistency was changed to such an extent as to offer difficulty when it came to injection. This condition was overcome by adding sterile physiological saline solution to the ground tissues. Our method of preparing the vaccine is as follows:

Susceptible cattle are inoculated subcutaneously with 2 to 10 cubic centimeters of fresh, citrated blood from an animal in the acute stages of rinderpest. The infected animals usually develop temperature evidence of rinderpest on the third day following inoculation. A day or two later the characteristic diarrhœa sets in together with other manifestations of acute rinderpest. With the onset of diarrhœa the temperature starts to drop. At this point the animals are bled to death and with aseptic precautions the spleen, liver, and various glands (submaxillary, prescapular, inguinals, etc.) are removed and placed in sterile, covered containers. The mesenteric glands are, for reasons previously stated, omitted.

In the beginning we included the kidneys and testicles in the preparation of the vaccine. As now prepared these organs are omitted. The kidneys have been found frequently to contain bacteria, and the testicles are of low potency for vaccine production.

The collected tissues are then conveyed to the laboratory and as much of the fat and fasciæ as possible carefully trimmed from them. The organs are next placed in a 5 per cent solution of phenol for fifteen minutes and then carefully rinsed in two changes of sterile water. The tissues are then cut in pieces of convenient size to put through a large, sterilized food chopper, the ground material being collected in a sterile container as it comes through the machine. This ground tissue is then carefully covered to prevent contamination and placed in the refrigerator at a low temparture (2° C.) and allowed to remain until the following day. After thus standing the tissue grinds better.

The next step is to put the ground material through a specially constructed grinder which will grind the tissue so fine that most of the mass can be readily worked through a forty-mesh sieve. In using this grinding machine it is sterilized and the tissues put through it five or six times, grinding a little finer each time. With the aid of a sterile pestle this finely divided tissue is immediately worked through a sterile, forty-mesh sieve into a sterile, tared container. The weight of the tissue is ascertained and for each gram of tissue 1 cubic centimeter of sterile physiological saline solution is added and a thorough mixture made. This is then placed in sterile stock bottles and sufficient chloroform added to give a concentration of 0.75 per cent. The bottles are then tightly stoppered, well shaken, dipped in a 10 per cent solution of liquor cresolis compositus, and stored in the refrigerator. The chloroform destroys the rinderpest virus within several hours and is not detrimental to the immunizing constituent of the vaccine. In most of our experiments the vaccine has been used within forty-eight hours after preparation.

The grinding of the tissue is an important part of the process. First the tissue must be finely divided to permit the chloroform to quickly destroy the rinderpest virus. Then a finely divided state is essential in order that the finished product may be readily injected without clogging the syringe needle.

While not absolutely essential, it has also been our practice to shake the bottles of vaccine several times during the period they are in the refrigerator, for the purpose of distributing the chloroform, which settles to the bottom.

We are also careful not to contaminate the necks of our stock bottles when filling them with the virulent tissue mixture. Then as an added precaution, after adding the chloroform and just before inserting the stopper, we swab the inside of the necks of the bottles with chloroform. Obviously, the purpose of this is to eliminate the possibility of trouble from virulent material that might get between the neck of the bottle and the stopper and escape the action of the chloroform.

While we have fully demonstrated that this vaccine can be safely injected within two or three hours following its preparation, we have observed that it is better to allow it to stand forty-eight hours or more before use. If injected within two or three hours after preparation a slight irritating effect results from the chloroform. While this is in no way serious it can be avoided by allowing the vaccine to stand a day or two.

TEST OF VACCINE PREPARED BY THE MEDICAL DEPARTMENT RESEARCH BOARD

The first test of our chloroform-treated vaccine was carried out with four head of cattle. In this and in all of our subsequent work with cattle the animals used were imported direct from Fuga Island by the Bureau of Agriculture. Rinderpest does not occur on Fuga, so consequently cattle from there are all susceptible to the disease.

In this test three of the four animals were each given three subcutaneous injections of 10, 15, and 15 cubic centimeters, respectively, of vaccine, an interval of one week elapsing between the injections. The fourth animal served as a control and thus received no vaccine. Ten days subsequent to the administration of the last dose of vaccine each of the four animals was given 2 cubic centimeters of virulent rinderpest blood subcutaneously. Table 1 indicates the results.

TABLE 1.—*Test of chloroform-treated vaccine on cattle from Fuga Island.*

[Three of the four head of cattle included in this table each received three injections of vaccine prepared from a mixture of tissue and blood. The doses were 10, 15, and 15 cubic centimeters, respectively, administered at weekly intervals. One animal control.]

Animal No.	Vaccination completed.	Infected.	Amount of virus.	Results.
			cc.	
6214	Aug. 28, 1926	Sept. 7, 1926	2	Slight reaction. Survived.
6215	do	do	2	No reaction. Survived.
6222	do	do	2	Do.
6219	Control	do	2	Developed severe case acute rinderpest. Would have died but killed to conserve tissues.

Thus, in this test all three of the vaccinated animals survived the infection, two with no reaction whatever, the third with a slight temperature reaction. The control promptly developed an acute case of rinderpest and would have died from the same, but in order to utilize the tissues for the preparation of more vaccine it was destroyed when in the proper stage of the disease for vaccine production.

TEST TO DETERMINE THE RELATIVE VALUE OF BLOOD AND OTHER TISSUES FOR THE PRODUCTION OF VACCINE

The first step toward determining the value of the various ingredients entering into the preparation of this vaccine was to make three separate lots of vaccine from a given group of animals infected for the purpose. One lot was prepared from blood alone, a second lot from a mixture of the various organs, while the third lot was made in the usual way and represented a combination of the blood and organs.

Twenty head of cattle were used to test these three lots of vaccine. They were divided into two groups of ten each. In one group four animals were each given three doses of the vaccine prepared from the blood alone; four were treated in a similar manner with vaccine prepared from the combination of various organs and the remaining two served as controls. In the other group eight of the ten head of cattle were each given three doses of the vaccine prepared from the mixture of blood and organs, the remaining two animals serving as controls for this group.

The dates of vaccination were the same for both groups of animals. However, the group that received the vaccine prepared from the mixture of blood and organs was infected two days after the other group. As it was our intention to utilize for vaccine production all animals that developed rinderpest, we infected the two groups on different dates in order that we would not have more animals than we could handle in a given time should a large percentage of them develop the disease.

Table 2 shows the results obtained with the four animals that received vaccine prepared from the blood alone and the four that received vaccine made from the organ tissue.

TABLE 2.—*Test of the relative value of blood and other tissues for the production of vaccine.*

[Four of the ten head of cattle included in this table each received three doses of vaccine prepared from blood alone; four received three doses of vaccine prepared from tissue alone, and the remaining two served as controls. Doses of vaccine given were 10, 15, and 15 cubic centimeters, respectively, administered at weekly intervals.]

Animal No.	Type of vaccine.	Vaccination completed.	Infected.	Amount of virus. cc.	Results.
6307	Blood	Oct. 14, 1926	Oct. 29, 1926	2	Developed acute rinderpest. Would have died but killed to conserve tissues.
6308	do	do	do	2	Do.
6340	do	do	do	2	Do.
6354	do	do	do	2	Do.
6338	Tissue	do	do	2	Slight temperature reaction. Survived.
6341	do	do	do	2	No reaction whatever. Survived.
6346	do	do	do	2	This animal developed a septic condition of the foot and died before test was completed.
6349	do	do	do	2	No reaction. Survived.
6294		Control	do	2	Developed acute rinderpest. Would have died but killed to conserve tissues.
6305		do	do	2	Do.

As indicated in Table 2 the four head of cattle receiving the vaccine prepared from the blood were not protected. As a matter of fact, they showed no evidence of the slightest degree of immunity. They developed rinderpest at the same time and in as severe a form as the controls. On the other hand, the animals that were vaccinated with vaccine prepared from the mixture of organs (lymph glands, spleen, liver, kidneys, and testicles) survived the rinderpest infection. One of the latter four animals, however, had, at the time the test was started, a septic condition of the foot which later proved fatal. It was thought in the beginning that the condition would not seriously interfere with the experiment and because the supply of susceptible cattle happened to be low at the time this animal was used. It died, however, of septicæmia before the test was completed.

The results obtained with the group of cattle vaccinated with the vaccine prepared from the mixture of blood and organs are shown in Table 3.

TABLE 3.—*Test of vaccine prepared from the mixture of blood and organs.*

[Eight of the ten head of cattle included in this table each received three injections of vaccine prepared from a mixture of tissue and blood. The doses were 10, 15, and 15 cubic centimeters, respectively, administered at weekly intervals. The last two animals were controls.]

Animal No.	Vaccination completed.	Infected.	Amount of virus.	Results.
			cc.	
6296	Oct. 14, 1926	Oct. 27, 1926	2	No reaction whatever. Survived.
6319	do	do	2	Slight reaction. Survived.
6342	do	do	2	Do.
6359	do	do	2	Do.
6361	do	do	2	Developed rinderpest in chronic form. Died from same 24 days subsequent to administration of virus.
6310	do	do	2	Survived rinderpest infection but died later of unknown cause. In poor condition from start.
6362	do	do	2	Slight reaction. Survived.
6377	do	do	2	Survived infection without reaction.
6293	Control	do	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.
6385	do	do	2	Do.

It is thus seen that seven of the eight vaccinated animals survived the infection with rinderpest virus. One of the eight was not sufficiently protected and developed the disease. This animal had the disease in a mild form in the beginning, but it subsequently became chronic and finally resulted in death. A second animal in this group survived the rinderpest infection but died later of an undetermined cause. The two control animals promptly developed acute rinderpest in a severe form and were utilized for the production of vaccine.

Following these results it was decided to discontinue the use of blood in the vaccine prepared by the research board.

TESTS TO DETERMINE THE VALUE OF THE VARIOUS ORGANS FOR VACCINE PRODUCTION

We prepared four lots of vaccine representing different tissues from a given group of animals infected for vaccine production. One lot was made from the lymph glands, another lot from the liver, one from a mixture of kidneys and testicles, and the fourth lot from spleen tissue.

Ten head of cattle were employed for a test of these preparations. Two animals were used for each type of vaccine, and the remaining two served as controls. The vaccinated animals received three 10-cubic-centimeter doses of vaccine, a period of one week elapsing between doses. The results of this test are given in Table 4.

TABLE 4.—*Tests to determine the value of the various organs for vaccine production.*

[Eight of the ten head of cattle included in this table each received three doses of vaccine prepared from the various tissues indicated. Each dose consisted of 10 cubic centimeters of vaccine administered at weekly intervals.]

Animal No.	Tissues in vaccine.	Vaccination completed.	Infected.	Amount of virus.	Results.
				cc.	
6301	Lymph glands.	Nov. 26, 1926.	Dec. 11, 1926.	2	No reaction whatever. Survived.
6320	do.	do.	do.	2	Do.
6343	Liver	do.	do.	2	Do.
6344	do.	do.	do.	2	Do.
6348	Kidneys and testicles.	do.	do.	2	Do.
6365	do.	do.	do.	2	Do.
6371	Spleen	do.	do.	2	Do.
6376	do.	do.	do.	2	Do.
6298	Control		do.	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.
6336	do.		do.	2	Do.

All of the eight vaccinated animals survived the rinderpest infection without manifesting the slightest evidence of reaction. The two animals used as controls promptly developed acute rinderpest and were destroyed for vaccine production.

From this experiment it was evident that the tissues used were all of value for the production of vaccine. Of these tissues, it has been subsequently shown that the lymph glands and spleen, from a comparative standpoint, rank highest in potency for vaccine production. Vaccine prepared from these tissues alone will protect when administered in very small doses.

TEST OF VACCINE CONTAINING FIFTY PER CENT PHYSIOLOGICAL SALINE SOLUTION

As previously indicated, after omitting the blood in the preparation of our vaccine the consistency of the mixture was such as to render injection difficult. To overcome this we added an equal part of sterile, physiological saline solution to the tissue mixture. In order to prove that this addition of salt solution was not detrimental to the vaccine we subjected a lot of vaccine prepared in this manner to a test in which four head of cattle were employed. Three animals each received three injections of vaccine at weekly intervals. As the vaccine was diluted 50 per cent, the dose was increased to 20 cubic centimeters. The fourth animal served as a control. The results of this test are given in Table 5.

TABLE 5.—*Test of vaccine containing 50 per cent physiological saline solution.*

[Three of the four head of cattle included in this table each received three injections of vaccine prepared from a mixture of tissue and physiological saline solution. The doses were 20 cubic centimeters each. One animal control.]

Animal No.	Vaccination completed.	Infected.	Amount of virus.	Results.
			cc.	
6486	Mar. 1, 1927	Mar. 15, 1927	2	No reaction whatever. Survived.
6497	do	do	2	Do.
6499	do	do	2	Do.
6512	Control	do	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.

All three of the vaccinated animals survived the infection with virulent blood without reaction. The control animal promptly developed acute rinderpest. Since this test all of our vaccine has been prepared with physiological saline solution to facilitate injection.

DOSAGE AND NUMBER OF INJECTIONS OF VACCINE NECESSARY TO IMMUNIZE

Vaccine prepared according to our method has now been experimentally tested on several hundred head of cattle and carabaos. It has been found that three doses of 15 to 20 cubic centimeters each, administered at weekly intervals, afford a very solid immunity against a heavy artificial infection.

Early in our work we conducted a test to determine whether or not a single injection of vaccine would effectively immunize. In this test two animals were each given a single injection of vaccine which was about 1½ months old. The dose given one animal was 25 cubic centimeters, whereas the other received only 15 cubic centimeters. Two weeks later these two animals, together with a third used as a control, were each infected with 2 cubic centimeters of virulent rinderpest blood. The results are shown in Table 6.

TABLE 6.—*Test to determine if one injection of vaccine will immunize.*

[Two of the three head of cattle included in this table received 15 and 25 cubic centimeters, respectively, of a vaccine prepared from a mixture of tissue and blood. Such amounts were administered in one dose. The third animal served as a control.]

Animal No.	Vaccinated.	Amount of vaccine.	Infected.	Amount of virus.	Results.
		cc.		*cc.*	
6353	Oct. 1, 1926	25	Oct. 14, 1926	2	Slight reaction. Survived.
6357	do	15	do	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.
6363	Control		do	2	Do.

A single injection of 25 cubic centimeters of this vaccine protected cattle against the artificial injection. The animal receiving 15 cubic centimeters developed the disease and died as a result thereof.

It should be pointed out that this test was conducted before we had demonstrated that blood was of no value for vaccine production. Thus, this lot of vaccine contained approximately 25 per cent blood which we later proved to be inert. Had the vaccine been prepared according to our final method a single dose of an amount smaller than 25 cubic centimeters would have sufficed to immunize cattle.

As carabaos are exceedingly susceptible to rinderpest a similar test was conducted with such animals. This test indicated that if it was desired to limit the immunization of carabaos to a single injection of vaccine, a relatively large dose would be required. On the other hand, if in the preparation of the vaccine we limit ourselves to the use of only those tissues of the very highest potency for vaccine production (lymph glands and spleen), a single injection will undoubtedly suffice to immunize carabaos against infection. As a matter of fact, since the adoption of our method of preparing rinderpest vaccine, Dr. E. A. Rodier, of the Philippine Bureau of Agriculture, has obtained some very convincing evidence on this phase of the subject. These data are given in another article, by Doctor Rodier, appearing in this issue.

KEEPING QUALITIES OF THE VACCINE

In January, 1927, we tested a lot of vaccine which was three months old, on two head of cattle. Each animal received three 10-cubic-centimeter doses of vaccine, the injections being made at weekly intervals. Two weeks subsequent to the last injection the two vaccinated animals, together with two controls, were each infected with 2 cubic centimeters of virulent rinderpest blood. The results are recorded in Table 7.

TABLE 7.—*Test of the keeping qualities of vaccine that was 3 months old.*

[Two of the four head of cattle included in this table each received three injections of vaccine prepared from tissue alone. The doses were 10 cubic centimeters. Two controls included.]

Animal No.	Vaccination completed.	Infected.	Amount of virus.	Results.
			cc.	
6446	Jan. 24, 1927	Feb. 8, 1927	2	Slight temperature reaction. Survived.
6452	do	do	2	No reaction whatever. Survived.
6468	Control	do	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.
6483	do	do	2	Do.

The two vaccinated animals were fully protected by this vaccine. The two controls developed acute rinderpest and were destroyed for vaccine production.

On December 4, 1927, we initiated a test with a lot of vaccine that was exactly 1 year old. Three bulls were each given three doses of this vaccine, the injections being made at weekly intervals. Seventeen days subsequent to the injection of the last dose of vaccine, these three animals, together with a fourth used as a control, were each infected with 2 cubic centimeters of virulent rinderpest blood. The results obtained are recorded in Table 8.

TABLE 8.—*Test of the keeping qualities of vaccine that was 1 year old.*

[Three of the four head of cattle included in this table each received three injections of vaccine that was 1 year old at the time of administration. The fourth animal served as a control.]

Animal No.	Vaccination completed.	Infected.	Amount of virus.	Results.
			cc.	
7025	Dec. 18, 1927.	Jan. 4, 1928.	2	No reaction whatever.
7026	do.	do.	2	Do.
7028	do.	do.	2	Do.
7039	Control	do.	2	Developed acute rinderpest. Would have died but was killed to conserve tissues.

The results clearly indicate that this vaccine will retain its potency for a period of at least one year. It will undoubtedly keep for a still longer period. Further tests will be conducted to determine this point.

One of the out-standing features of all of this work has been the very solid type of immunity conferred by this vaccine. We have now tested the product on several hundred animals, and in most instances subsequent artificial infection of vaccinated animals has failed to cause even a temperature rise. This is illustrated by the temperature charts (figs. 1 to 4) of the four animals employed for the test of the lot of 1-year-old vaccine.

SUMMARY AND CONCLUSIONS

A highly efficacious vaccine against rinderpest can be prepared from a suspension of finely ground tissues (lymph glands, spleen, and liver) from animals killed in the acute stages of rinderpest.

We have demonstrated that the rinderpest virus in such vaccine can be promptly killed, without injuring the product, by the addition of 0.75 per cent chloroform. Such vaccine can be used immediately after preparation and possesses excellent keeping qualities, remaining potent for at least one year.

Vaccine prepared from blood alone possesses no value whatever as an immunizing agent. Thus, as the rinderpest virus is present in the blood in large amounts during the acute stages of the disease, it is apparent that the active principle of the tissue vaccine is not merely virus killed by chloroform. Whatever it is, it is not present in demonstrable amounts in the circulating blood but only in certain of the other tissues. This suggests the possibility that the immunizing principle is either some biproduct of the reaction between tissue and virus or the

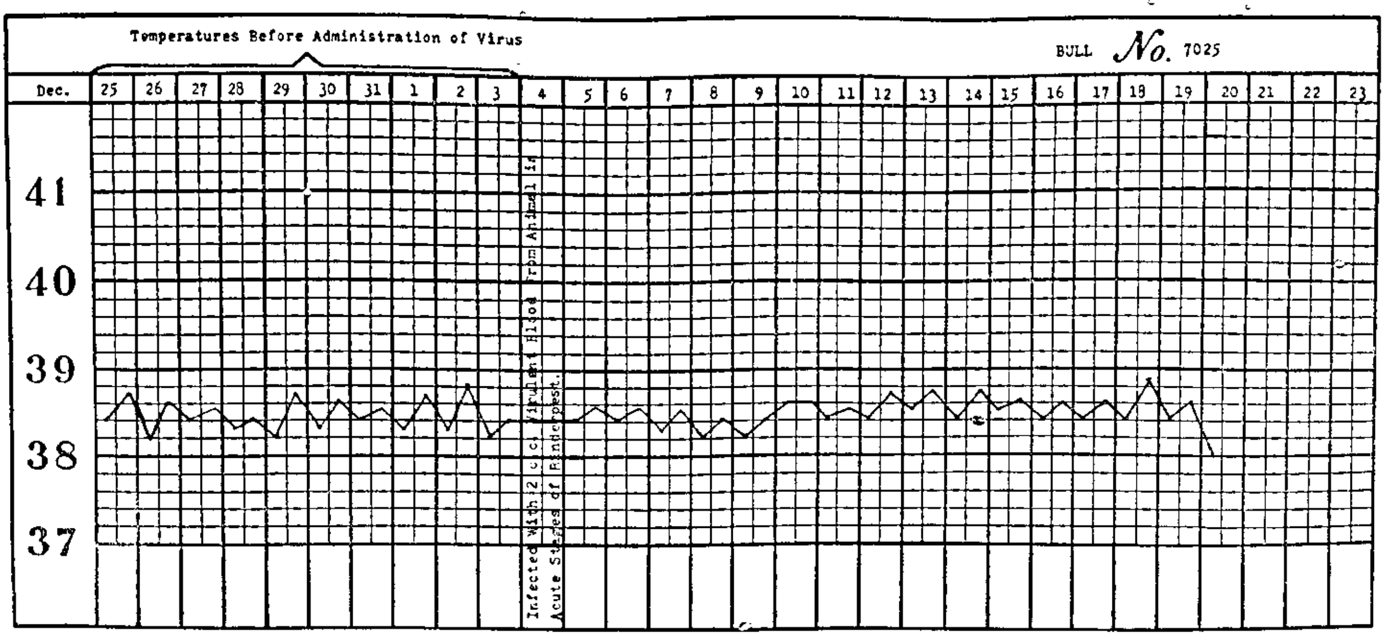

FIG. 1. Temperature chart of test animal 1. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.

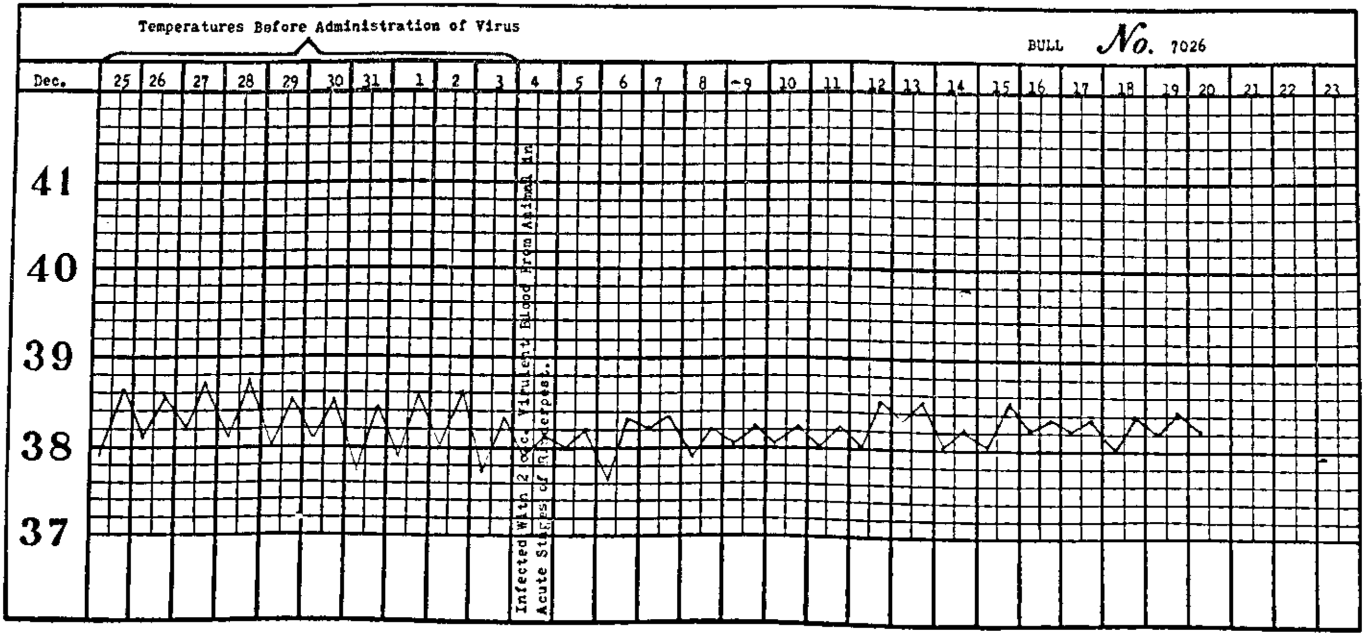

FIG. 2. Temperature chart of test animal 2. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.

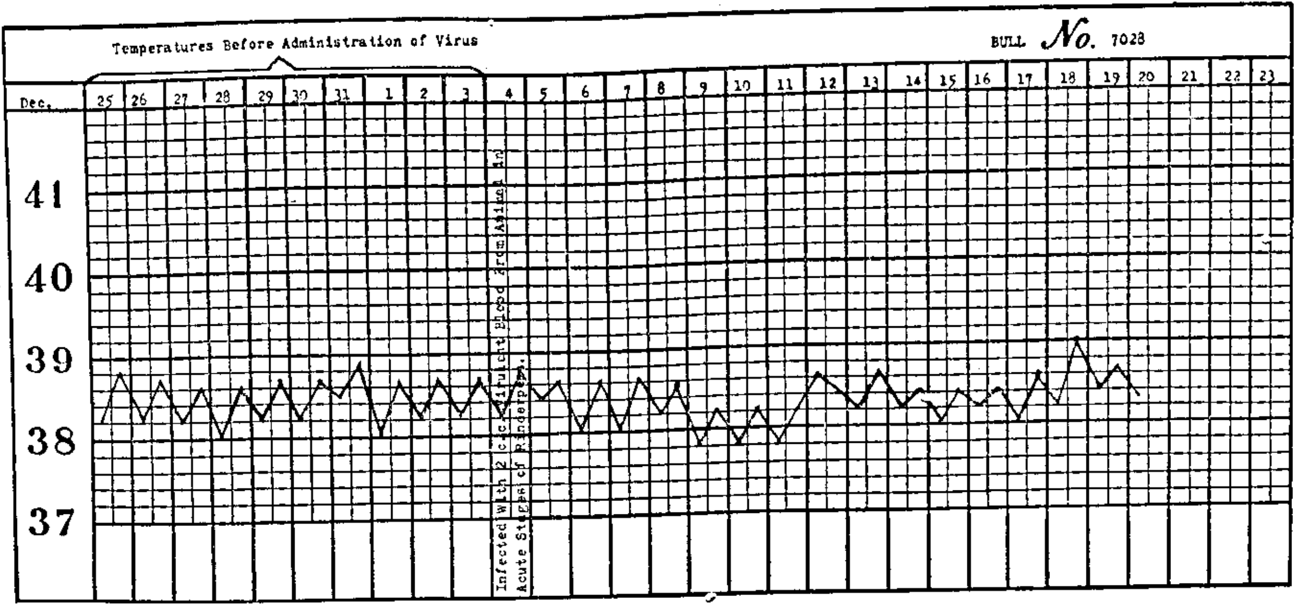

FIG. 3. Temperature chart of test animal 3. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.

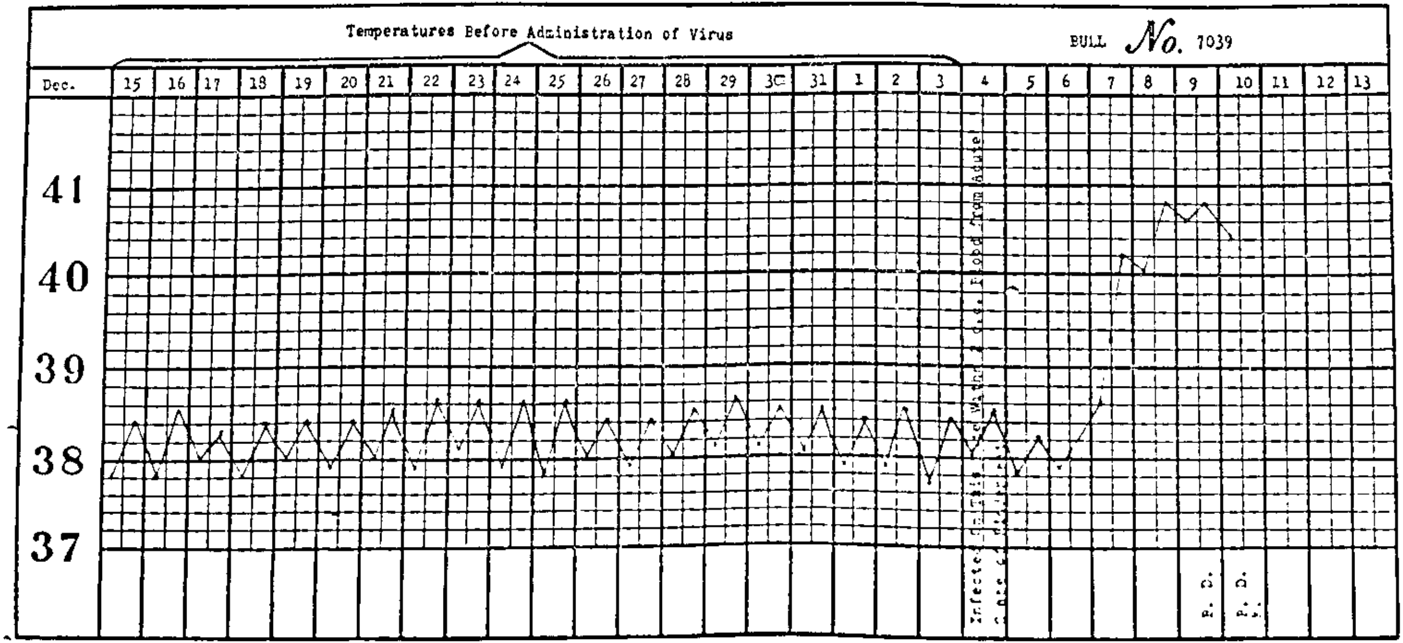

FIG. 4. Temperature chart of control animal. B. D., bloody diarrhœa; K., animal would have died but was killed in the acute stage of the disease in order that tissues could be used for vaccine.

rinderpest virus which has been changed in some particular way by the activity of the solid tissues.

Tests of this vaccine on a large number of cattle and carabaos, used in the various experiments, have fully established its worth.

Three 20-cubic-centimeter doses of vaccine, with an interval of one week between doses, afford both cattle and carabaos a very solid immunity against severe infection.

Experimentally we have obtained evidence that the number of injections of vaccine can probably be reduced from three to one, at least in cattle. However, as carabaos are extremely susceptible to rinderpest, if a single injection of vaccine is to be employed for immunization, it appears desirable, in the preparation of vaccine for such animals, to use only the tissues of very highest potency (lymph glands and spleen). Further and more-extensive tests on this phase of the subject, by Dr. E. A. Rodier, of the Philippine Bureau of Agriculture, substantiate this view.

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ILLUSTRATIONS

TEXT FIGURES

1. Temperature chart of test animal 1. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.
2. Temperature chart of test animal 2. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.
3. Temperature chart of test animal 3. Previous to infection this animal received three injections of rinderpest vaccine that was 1 year old.
4. Temperature chart of control animal. B. D., bloody diarrhœa; K., animal would have died but was killed in the acute stage of the disease in order that tissues could be used for vaccine.

A SINGLE-INJECTION METHOD OF IMMUNIZATION AGAINST RINDERPEST

By E. A. Rodier

Pathologist, Bureau of Agriculture, Manila

Rinderpest, since its introduction into the Philippine Islands, has been by far the most important disease problem with which veterinarians have had to cope. Since its introduction in 1886 or 1887, it has caused heavy losses annually, especially in 1900 when it killed more than 90 per cent of the cattle and carabaos in some provinces, thereby reducing former livestock men to poverty and preventing agriculturists from tilling the soil.

In the last years of the past century virtually no control measures were enforced. The first serious efforts to control rinderpest in the Philippine Islands began in 1901, when the Board of Health in its inadequately equipped laboratory did some work with bile as an immunizing agent, which was tried out on a small scale with indifferent success. The problem became more acute, and in 1902 an act passed by the Philippine Commission provided for the establishment of a "Serum Institute" for the manufacture of rinderpest serum and virus and for research. At that time the method used was to give 1 cubic centimeter of virus and 30 cubic centimeters of serum. Immunization then proceeded on a much larger scale than heretofore. Efforts to check the spread of rinderpest among native cattle and carabaos by the simultaneous method were fairly successful, but the veterinarians faced grave difficulties because the people expected them to bring medicine to cure their sick animals. When it was observed that they took blood from the sick animals and injected it into well ones, livestock men at once feared that the veterinarians were trying to spread the disease rather than check it. In more than one instance the hostility aroused was so great that it was deemed expedient to abandon immunization entirely, especially in view of the fact that in many cases operations were rendered ineffective by cattle owners driving their animals into the mountains instead of presenting them for treatment.

In addition to this difficulty, as pointed out by Kelser,[1] the simultaneous method of immunization against rinderpest has several distinct shortcomings. He says:

> In the first place, a certain percentage of animals receiving this treatment develop severe reactions and some losses from rinderpest occur as a direct result of vaccination. Then again, reacting animals are readily capable of spreading rinderpest to susceptible animals if contact is afforded; hence this feature must always be given due consideration when the simultaneous method of immunization is contemplated.

Because of the strong prejudice against the simultaneous method it was abandoned and serum alone was employed as an aid to quarantine to stop the general spread of the disease. This method was effective in checking an outbreak but conferred immunity of only short duration. By 1909 the output of rinderpest serum was quadrupled and all veterinarians that could be secured were engaged in the control of rinderpest.

In 1911 a well-organized campaign for the eradication of rinderpest was started in central Luzon. Strict quarantine, enforced with the aid of the Philippine Scouts, was begun at this time. As a result of these quarantine campaigns, the incidence of rinderpest in the Islands was greatly reduced. As the work went on, however, many farmers came to believe that the Bureau of Agriculture was too stringent in the enforcement of quarantine measures. This idea gradually gained ground and unfortunately finally resulted in the passage of an act which provided that while the Director of Agriculture should prescribe the necessary measures, under the provisions of this act the enforcement of these measures was delegated to the governor of the province concerned.

The control of rinderpest has since been a still more difficult problem. This is due to several factors peculiar to the Philippines. First, the nature of the country itself makes the enforcement of rigid quarantine a very difficult task. There are practically no fences for livestock in the Islands, and it has been the custom since time immemorial to allow animals to intermix freely. These factors aid in the rapid spread of this disease. Second, much of the animal population is to be found in mountainous country. These animals are in a semiwild state, and it requires a large force of men to prevent them from passing established quarantine lines. Third, there was much difficulty experienced in persuading the people themselves to observe quarantine rules and coöperate with the field veterinarians in doing their part to stamp out the disease. Some of this opposition was due to the fact that quarantine measures, by restricting the movement of cattle and carabaos, necessarily imposed hardships upon a few for the benefit of all; and the result was that livestock men in many instances presented every obstacle possible to prevent quarantine being established. These facts showed the urgent necessity for a method of preventing rinderpest that would make such quarantine measures unnecessary.

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[1] This issue.

The details of Boynton's original work and subsequent experimentation on the development of better vaccine for immunization against rinderpest are given by Kelser.[2] This investigator, in collaboration with Stanton Youngberg and Teodulo Topacio, has shown that that work has resulted in the production of a vaccine that can be quickly prepared, retains its potency for a long time in storage, and when given in three injections at intervals of one week, will confer a very solid immunity against a heavy artificial infection. This method of preparing vaccine has been adopted by the Bureau of Agriculture.

On account of the difficulties experienced in carrying on vaccination work in the field, it became apparent that if the number of injections could be reduced, the work would be greatly facilitated. That many animals in an infected district can be quickly immunized and that two-thirds of the field expenses can be saved, partly indicate the desirability of a single-injection method.

Early in his work, Kelser obtained evidence that tended to indicate that animals could be satisfactorily immunized against rinderpest by a single injection of vaccine. With a view to obtaining more data along this line, this phase of the work was extended by the Veterinary Research Laboratory of the Bureau of Agriculture and the results are reported in this paper.

As a result of all this work on tissue vaccine, it has become evident that the tissues of very high potency are the lymph glands, tonsils, and spleen. While the ordinary vaccine given in a single dose would undoubtedly immunize cattle against a field infection, because of the high susceptibility of carabaos to rinderpest, it was deemed advisable to test a vaccine prepared from the tissues of the highest potency, which were found to be the lymph glands, tonsils, and spleen. This does not mean that any of the tissues formerly employed are of no value. In an effort to limit the size of the dose for a single injection, we prepared several lots from the lymph glands and from lypmh glands, tonsils, and spleen, and subjected them to tests on cattle and carabaos.

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[2] Loc. cit.

Experiment 1.—To determine the potency of a vaccine made from mesenteric lymph glands when given in two injections. The carabaos used in this experiment each received two injections of a vaccine prepared from mesenteric lymph glands. The doses were 4 and 6 cubic centimeters, respectively, administered at one week interval. All animals received 2 cubic centimeters of virulent virus. The results are shown in Table 1.

TABLE 1.—*Showing the results of experiment 1.*

Animal No.	First injection.	Second injection.	Infected.	Results.
726	Aug. 22, 1927.	Aug. 29, 1927.	Sept. 6, 1927	Slight temperature reaction.
728	do.	do.	do.	No reaction.
729	do.	do.	do.	Developed rinderpest but recovered.
730	do.	do.	do.	Do.
727	Control		do.	Developed acute rinderpest. Killed to conserve tissue. Good lesions.

Early in 1927 we discontinued the use of mesenteric lymph glands from our regular vaccine because it was found that these glands frequently contained pathogenic, spore-bearing organisms (*Clostridium oedematis-maligni*, *C. tetani*, etc.) This was done in order to avoid the possibility of infection by these organisms when the vaccine was put to field use. These mesenteric lymph glands were not discarded however. The glands obtained from each animal were tested to determine the presence of pathogens. Aërobic and anaërobic cultures were made and a special test for tetanus toxin consisting of inoculation into guinea pigs of the filtrate from Berkefeld-filtered glucose bouillon covered with mineral oil which had been inoculated with finely ground glands and incubated for six days at 37° C. All mesenteric lymph-gland tissue passing this test was made into a vaccine in the usual way.

The result of this test showed that a vaccine made according to the chloroform method from mesenteric lymph glands would protect carabaos when given in small dosage in two injections. It also showed that a 4- and a 6-cubic-centimeter dose administered at an interval of one week was the minimum protective dosage for this vaccine.

The first practical use of the single-injection method, using a chloroform-treated vaccine made from mesenteric lymph glands, was on September 20 when forty-six carabaos belonging to the Philippine Trust Company were brought to the Pandacan quarantine station for isolation. When they arrived at the station, four carabaos were showing evidence of being in an advanced stage of rinderpest infection. These animals were placed in a hospital isolation shed. Three of them subsequently died. The forty-two remaining animals received a single injection of 15 cubic centimeters of this vaccine without delay, despite the fact that they had all been exposed. Of this number, there were only six that did not subsequently show fever temperature. In order to prove that these animals were protected, six of them were given virulent blood with a control. When the control was killed for vaccine, it showed typical rinderpest temperature, clinical symptoms, and post-mortem lesions. None of the vaccinated animals showed any evidence of rinderpest.

Objection can be made that as the forty-two carabaos above referred to were exposed they may have become immune as the result of possible infection, the vaccine merely acting as an aid. In order to settle this question, another experiment will be cited. On December 20 nine susceptible carabaos, whose history and preinjection temperatures were known, were brought from Alabang and placed in a noninfected shed at Pandacan. Seven of these animals were given a single injection of 15 cubic centimeters of this same vaccine. Ten days later the vaccinated animals and two that were reserved for control were given 2 cubic centimeters each of virulent virus. The two controls were killed on the fifth and sixth days, respectively, showing typical rinderpest temperature, clinical symptoms, and post-mortem lesions. None of the seven receiving vaccine showed any clinical symptom of rinderpest. Four of them, however, showed slight temperature reaction.

Experiment 2.—To determine the minimum dosage that would immunize highly susceptible cattle with two injections. The cattle included in this experiment were injected with a vaccine prepared from mesenteric lymph glands. The doses were 2 and 4 cubic centimeters, respectively, administered at one week interval. Two cubic centimeters of a known virulent virus were used to test immunity. The results are shown in Table 2.

TABLE 2.—*Showing the results of experiment 2.*

Animal No.	First injection.	Second injection.	Infected.	Results.
6798	June 27, 1927	July 4, 1927	July 23, 1927	No reaction.
6840	-----do-------	-----do-------	-----do-------	Do.

The two animals used in this test showed not even a temperature reaction following the injection of virulent blood nineteen days after the second injection. This test was carried out on Fuga animals, which long experience has proven to be the most susceptible cattle in the Philippine Islands. This result was very encouraging, especially in view of the fact that the dosages employed were but 2 and 4 cubic centimeters.

Experiment 3.—To determine the minimum dosage of a vaccine prepared from glandular tissues alone that would protect cattle with but one injection. Three of the four Fuga cattle included in this experiment were injected with varying dosages of a vaccine prepared from mesenteric lymph glands and tonsils. The fourth served as a control. Amount of virus given, 2 cubic centimeters each. The results are shown in Table 3.

TABLE 3.—*Showing the results of experiment 3.*

Animal No.	Vaccinated.	Amount.	Infected.	Results.
		cc.		
7012	Nov. 28, 1927	3	Dec. 8, 1927	Developed acute rinderpest. Killed to conserve tissue. Good lesions.
7011	......do......	4	......do......	Very slight temperature reaction.
7009	......do......	5	......do......	Do.
7044	Control......	....	......do......	Developed acute rinderpest. Killed to conserve tissue. Good lesions.

From inspection of these tables it will be noted that the test animals receiving 4 and 5 cubic centimeters of vaccine showed no clinical symptoms although there was a very slight temperature reaction in each case, which indicated that these animals received the minimum protective dose, especially as the test animal that received 3 cubic centimeters developed acute rinderpest and was killed for vaccine.

Experiment 4.—To determine the minimum protective dose of a vaccine prepared from glandular tissue that would protect carabaos with but one injection. Two of the carabaos included in this experiment received each 10 cubic centimeters single injection of a vaccine prepared from mesenteric lymph glands, while the other two received 15 cubic centimeters each, followed by 2 cubic centimeters each of virulent virus in fifteen days. The results are shown in Table 4.

TABLE 4.—*Showing the results of experiment 4.*

Animal No.	Vaccinated.	Amount.	Infected.	Results.
		cc.		
731	Aug. 22, 1927	10	Sept. 6, 1927	No reaction.
732	do	10	do	Do.
734	do	15	do	Do.
735	do	15	do	Temperature reaction.

This test demonstrated that susceptible carabaos could be protected against an artificial infection with one injection of 10 cubic centimeters of a vaccine prepared from lymph glands only. Considering the difference of susceptibility of individual animals, it may also be noted that it requires about twice as much vaccine to protect carabaos as is necessary to confer immunity upon cattle.

Experiment 5.—To determine the minimum protective dosage in single injection of a vaccine prepared from lymph glands and tonsils, for carabaos of known susceptibility. Seven of the carabaos included in this experiment received 15 cubic centimeters each of a vaccine prepared from lymph glands and tonsils. The last two were used as controls. Amount of virus given, 2 cubic centimeters each. The results are shown in Table 5.

TABLE 5.—*Showing the results of experiment 5.*

Animal No.	Vaccinated.	Infected.	Results.
642	Dec. 20, 1927	Dec. 30, 1927	No reaction.
686	do	do	Slight temperature reaction only.
689	do	do	Do.
687	do	do	No reaction.
738	do	do	Do.
739	do	do	Slight temperature reaction only.
740	do	do	No reaction.
685	Control	do	Developed acute rinderpest. Killed to conserve tissue. Good lesions.
563	do	do	Do.

The carabaos used in this test were obtained from the Alabang stock farm and brought to the veterinary research laboratory for that purpose. Seven of these animals were injected with 15 cubic centimeters each of a vaccine prepared from lymph glands only, two animals being left unvaccinated as controls. Ten days following the single injection of vaccine, all nine animals received the same lot of a virus which was proven to be virulent because the controls manifested typical rinderpest temperature and clinical symptoms. When they were killed to conserve tissue for vaccine production, they showed good post-mortem lesions of rinderpest.

Three of the seven carabaos protected by this vaccine showed slight temperature reaction only. None of them showed clinical evidence of disease at any time throughout the test.

The results of tests conducted thus far showed conclusively that a solid immunity could be conferred upon highly susceptible carabaos against a heavy artificial infection with a single injection of 15 cubic centimeters of a vaccine prepared according to the method described by Kelser, but limiting the tissues employed to lymph glands and tonsils, and that our most susceptible cattle could be protected with as little as half that amount. The writer therefore negotiated with the Calamba Sugar Estate for a field test. One hundred animals were given a single injection of a vaccine made in the usual way from lymph glands only, using a dosage of 20 cubic centimeters. Two weeks following the test, six of these vaccinated animals picked at random were isolated and with one young susceptible carabao for control, each was inoculated with 2 cubic centimeters of virulent virus. Dr. Leon Sanchez, of the veterinary research staff, made his residence on the premises for two weeks following the injection of virus and closely observed the animals at all times. At no time did any of the vaccinated animals give evidence of disease or indisposition either by temperature reaction or clinical symptoms. The control died of rinderpest fourteen days after inoculation. It is thus apparent that probably the smaller dose employed in experiment 5 would very likely have sufficed.

Having established the efficacy of the vaccine when its preparation was limited to the use of glandular tissues alone, it was decided to make another lot using spleen, lymph glands, and tonsils. The spleen and the tonsils were added because other experiments not given in this paper had shown that these tissues were also very high in potency.

Experiment 6.—To determine the minimum protective dosage for cattle of a vaccine made from spleen, lymph glands, and tonsils. Four animals were used for testing this lot of vaccine.

Three of the four cattle included in this experiment received varying dosages of a vaccine prepared from spleen, lymph glands, and tonsils. The fourth was used as control. Amount of virus given, 2 cubic centimeters each. The results are shown in Table 6.

TABLE 6.—*Showing the results of experiment 6.*

Animal No.	Vaccinated.	Amount.	Infected.	Results.
		cc.		
7017	Nov. 28, 1927	3	Dec. 8, 1927	Slight temperature reaction.
7018	do	4	do	No reaction.
7020	do	5	do	Do.
7044	Control		do	Developed acute rinderpest. Killed to conserve tissue. Good lesions.

It will be noted that in 3-cubic-centimeter dosage, there was but a slight temperature reaction following the inoculation of virulent virus given ten days following the vaccine. In 4- and 5-cubic-centimeter dosages, there was no reaction whatever. Although the control was killed on the sixth day for conservation of tissue, it showed every evidence of rinderpest infection. This test established the fact that no increase in dosage is necessary with a vaccine prepared from spleen, lymph glands, and tonsils.

Previous to the perfection of the single-injection method, it was the custom to immunize these animals by the simultaneous method. The animals were given 500 cubic centimeters of antirinderpest serum to protect them for a week or ten days until they would recover from the effects of the long trip. Then they were simultaneously immunized with 1,000 cubic centimeters of serum and 5 cubic centimeters of virus. Subsequent reactions were then controlled with serum. With the last three bulls from Australia immunized in this manner, 4.5 liters of serum were used on each animal and even then each of the three animals manifested temperature reaction reaching a peak on the fifth day of 41.2° C. followed by clinical symptoms of rinderpest. While all three animals eventually recovered, it was with the greatest difficulty that they were saved.

The most severe and final test that has been made with vaccine prepared with spleen, lymph glands, and tonsils administered in single doses was in the immunization at this station of twelve bulls imported from Australia. These animals were given 20 cubic centimeters of vaccine prepared from spleen, lymph glands, and tonsils, one injection only. At the same time two of our known susceptible animals were vaccinated as a control on the potency of the vaccine. Eight days after vaccination, the virus was given to the two vaccine controls, together with two controls on the virus used. As the vaccine-control animals gave no evidence of a reaction sixteen days after the Australian animals were vaccinated, they received 2 cubic centimeters of virulent virus together with two controls. None of the Australians developed the slightest evidence of disease throughout the test, while the two virus controls developed rinderpest and were killed for vaccine production.

CONCLUSIONS

1. Tests by the Bureau of Agriculture of a vaccine prepared according to the method described in the paper by Kelser with the collaboration of Youngberg and Topacio has fully established the value of the vaccine.

2. Under conditions existing in the Philippine Islands, rinderpest control work will be facilitated if the number of injections of vaccine can be reduced.

3. Early test of the vaccine prepared according to the method of Maj. R. A. Kelser indicated possibilities along this line. Further and more extensive tests on this phase by the writer have indicated the following:

(*a*) That for ordinary purposes with cattle under field conditions, a single injection of chloroform-treated vaccine prepared with spleen, lymph glands, and liver will undoubtedly protect against natural infection. However, as carabaos are highly susceptible to rinderpest, if the preparation of the vaccine is limited to the use of spleen, lymph glands, and tonsils the objections arising from the use of a dose too large to be practical for field use can be overcome by eliminating the less-potent liver when preparing a vaccine for use on carabaos.

(*b*) That several tests in which twenty of the cattle and twenty-seven of the carabaos were inoculated with virulent virus, definitely show that a satisfactory immunization can be produced against a heavy artificial infection with a single dose of a vaccine prepared from spleen, lymph glands, and tonsils.

(*c*) That a dosage of 20 cubic centimeters for carabaos and 10 cubic centimeters for cattle is in every way entirely satisfactory for field use.

4. Research is also necessary to determine the length of immunity conferred by the single-injection method as compared with the three-injection method. Investigation on this phase of the problem will be continued.

ACKNOWLEDGMENT

The writer is indebted to Dr. Stanton Youngberg, director of the Bureau of Agriculture, and Maj. R. A. Kelser, of the United States Army Medical Department Research Board, for the many valuable suggestions given by them during the pursuance of this work.

ISNEG TEXTS WITH NOTES[1]

By OTTO SCHEERER

Of the University of the Philippines, Manila

ONE TEXT FIGURE

INTRODUCTION

When discussing in his "The non-Christian tribes of northern Luzon"[2] the question of the division of these peoples into tribes and dialect groups, the late Dean C. Worcester, after recognizing for northern Luzon the seven non-Christian tribes of "Negritos, Ilongots, Kalingas, Ifugaos, Bontoc Igorots, Lepanto-Benguet Igorots, and Tinguians," remarks (p. 861) that—

> A considerable amount of new work must be done before a satisfactory conclusion can be reached as to the dialect groups into which the seven tribes of northern Luzon should be divided.

The foregoing remark holds good as much to-day as when it was made some twenty years ago, the reason for our backwardness in the task of dividing those peoples linguistically being due not only to the absence, or rarity, of trained investigators, but also to the fact that the interior of northern Luzon is broken up dialectically quite as much as topographically. Where almost every valley, often each small group of settlements, has developed its own little unit of speech it requires indeed a considerable amount of new work to record such units in the first place individually, to compare and group these afterwards, and finally to arrive, through further study and comparison, at the ultimate establishment of the dialect groups had in mind by Worcester in saying:

> Where different dialects prevail among the members of a single tribe it should be subdivided into dialect groups. The differences in language

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[1] "The inclosed paper on Isneg Texts by Professor Scheerer is, to my knowledge, the first contribution on the dialects spoken in the Subprovince of Apayao. Professor Scheerer is to be congratulated for having produced a paper which is valuable, both from the linguistic and historical point of view. I consider it would be highly desirable to have it published in the Philippine Journal of Science."—From letter of Dean Maximo M. Kalaw, of the University of the Philippines, in transmitting this manuscript.—EDITORS.

[2] Philip. Journ. Sci. 1 (1906) 791–875, 67 pls.

between the people of different dialect groups of a tribe are of course far less radical than are those between the people of different tribes.

In the present paper an attempt will be made to clear up, as far as possible, the linguistic relations of that part of the Mountain Province in northern Luzon which is officially designated as the Subprovince of Apayao. This attempt will be made by presenting, in the first place, direct evidence from the mouth of the inhabitants themselves in the form of some of their popular stories, next by analyzing and annotating these texts, and by discussing the results thus obtained.

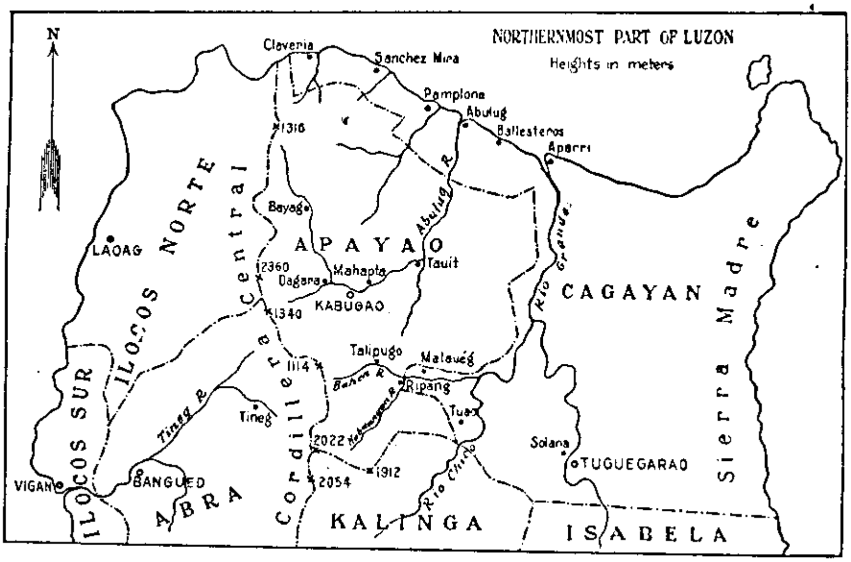

FIG. 1. Northernmost part of Luzon, showing the location of Apayao.

The subprovince mentioned was characterized by Worcester as "a hitherto almost unknown region." It owed this character, aside from the head-hunting proclivities of its inhabitants, to its peculiar geographic situation (see fig. 1). It is covered for the greater part with dense forests, and is hemmed in, on the west, by the high range of the Cordillera Central; on the east, by an extensive swamp region between the Abulug River and the Cagayan River; and on the south, by a spur of the Cordillera separating it from the equally inhospitable land of the warlike Kalinga. With a scantily inhabited coastal strip as its northern boundary the country in question has at all times been difficult of access, and has remained in almost primitive conditions until quite recent times. This should be born in mind in forming a judgment of the people from the texts here given.

Including a small number of immigrants from the neighboring Christian provinces Ilocos and Cagayan, the population of the Subprovince of Apayao amounted in the last census, of 1918, to about 11,000 souls, being composed of two racially quite different elements: a minority of Negritos, locally known as Agta, who occupy chiefly the already mentioned swamp region, and a majority of brown people commonly designated by outsiders as "Apayao," but who, according to my inquiries, admit for themselves more readily the tribal name of "Isneg" or "Itneg." Among themselves these Isneg use to allude to each other by prefixing *i*, the common particle of northern Luzon for forming tribal or community names, to that of their home place, be this simply a rancheria, that is a native settlement consisting often enough of only a few houses, or a somewhat wider locality. A person from a rancheria called Mahapta, for instance, would thus go in Apayao under the name of an "Imahapta." Having gone to another province, however, he would say of himself: "Isnaggà," "I am an Isneg."

It may now be stated that among these Isneg of Apayao I was enabled, by casual intercourse with several individuals from different localities, to distinguish two distinct dialect groups. I found a group located near the southern extremity of the subprovince and consisting of the rancherias Talipūgo, Tawīni, Pudtul, Katablañgan, Bedtuñg, Ili, and a few minor ones, which group, situated as it is along the Bāhen (or Bāhan) River (the Baren River of some maps) can be given the same name by which its members call themselves, and are called by their northern neighbors; namely, Ibāhen (or Ibāhan). To tell one of them to speak in his own dialect a companion would say to him: "Magibahen ka;" that is, "Speak as an (or 'in') Ibāhen." A special designation given this group by their neighbors on the Nabuañgan River in the southeast is Ià-bab.

A second dialect group, to the north of the Ibahen, and thus more centrally located, is made up by a number of rancherias surrounding the present subprovincial capital officially known as Kabugao.[3] These rancherias are Kà-buñgaw, Bulu, Nagbabálayan, Palītaw, Latwakan, Alumani, Nagsì-banán (Nagsim-

[3] Being specially concerned with popular pronunciation I adhere to a phonetic transcription of native words and thus shall write for Kabugao "Kabuhaw." A similar remark applies to other divergencies of spelling that may be found.

banán), Kolilímtaw, Hinà-bun͠g, and Mahápta, with some others. Kabuhaw proper is nowadays predominantly inhabited by Christian natives from Ilocos and Cagayan.

The first mentioned southern dialect group is represented in the following by the texts numbered I and II; the second central one, by texts III and IV.

The acquisition of these texts was made by me in a casual manner during vacation time in Baguio, in the mountains of Benguet. It was rendered possible through the courtesy of Prof. J. A. Wright, director of the Trinidad Farm School, who, as on previous similar occasions, afforded me every facility for prosecuting my studies among his students recruited from practically every part of the Mountain Province and some of whom hailed from the Subprovince of Apayao. The manner of recording the stories told me by the latter and here reproduced was very much the same as stated in my "Kalinga texts from the Balbalásang-Ginácang Group."[4]

The orthography followed for the vernacular in the present paper is in general the same as in my previous publications except that I have now adopted also for falling diphthongs the use of *y* and *w* and thus write, for example, *balay* and *algaw* in place of the former *balai* and *algao*. For the velar nasal I employ the symbol *n͠g* instead of the former *ng*, putting myself thus in accord with the best Filipino usage. Since in pronouncing a word of two or three syllables the weight of the voice appears to fall, through duration or stress, most often on the penult I give this as understood and have reserved the use of the acutus, with the exception of uncommonly long words, for those cases where the stress falls on the ultima. As a further guide for the reader I have marked a more or less lengthened penultima by a dash above the vowel. The glottal stop (or "hamzah"), which manifests itself by an abruptly checked pronunciation of a vowel, followed by a slight hiatus, has been marked with a grave accent and the encounter of this with an acutus leads naturally to the formation of a circumflex. In the dialects here newly recorded the glottal check very often indicates the elision of some consonant. In Ibanág it regularly replaces *p*, *t*, and *k* in final position, and is there represented in conventional orthography by writing such a quasi-mute letter separated by a hyphen from the body of the word. For instance, words written in my texts as *anà*, child, *manû*, chicken, appear in the Ibanág dictionaries as *ana-c, manu-c,* a spelling modified by Conant in his contributions to Philippine phonology to *ana*ᵏ, *manú*ᵏ. In my quotations from Ibanág I follow the latter method.

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[4] Philip. Journ. Sci. 19 (1921) 184.

The strange English used in translating the texts finds its excuse, of course, only in that it is designed to follow as closely as possible the peculiar diction of the vernacular.

TEXT I. FROM TALIPUGO

KALIÑGA SALDÀ TALIPUGO EY DUMADAGA	FEUD BETWEEN TALIFUGO AND DUMADAGA [5]
1. Mapūlu dagún timmalíb Talipugo ey Dumadaga magkokópun da. Ñgem issa algaw Galī ñga Italipugo napén nañgalyug ko Duy-un. Ked nu nagawíh ñgimmīna asu.	1. Ten years had passed that Talifugo and Dumadaga were living as friends. But one day Gali, a man from Talifugo, went to trade to Duy-un. Then, when he returned he bought a dog.

Title. *Kaliñga:* feud, enemy (Ibg. *Kaliñga,* Ilk. *kabusor,* enemy). *saldà:* between; *saldà iddí ey ituni:* between here and there.

1. *dagún,* year; *piga dinagún na?* How many years has he? (Ibg. *dagún,* Ilk. *tawén.*)

timmalíb, perfect of *tumalíb:* who or what passes; *talíban:* place to be passed, perfect *tinalíban; italíb:* what is carried in passing.

magkokōpun, who are friends; *kōpun:* friend (Ibg. *kofun,* Ilk. *gayyem*).

issa algaw: one day; better: *issa ñga algaw;* the ligature *ñga* is here as elsewhere often omitted (Ibg. *aggaw,* Ilk. *aldaw,* day).

napén, perfect of *mapén:* who goes; *papanen:* who is made to go; perfect *pinapen; Ipén mu liblu kagina:* Go and take the book (Sp. *libro*) to him. *Awâ kapannam?* Where are you going? (Ilk. *mapán,* who goes somewhere.)

nañgalyug, perfect of *mañgalyug:* who trades; *ialyug:* object of selling, perfect *nealyug; alyugan:* object of buying. *Inalyūgà* or *inalyūgan ku:* I bought it.

nagawíh, perfect of *magawíh:* who returns; *iyawíh:* what is taken along in returning (as something unsold on the market), perfect *neyawíh; nagawihán:* object bought on returning. In careful pronunciation the final *h* was heard as an unvoiced palatal fricative.

ñgimmina asu, better: *ñgimmina ko asu:* was buyer respecting a dog; *ñgumina,* who buys (Ibg., Ilk. *ñgina,* price). I had no means to determine whether the frequently careless diction of the texts was peculiar of the story-tellers or is typical of the dialects.

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[5] This is an account of the last head-hunting raid which occurred in Apayao about the year 1911.

2. Ñgem ya dālan saldà Talipugo ey Duy-un adú tōlay. Ñgem Galī madī na nasin͠gen agīda ta nagsūhù da kia asén͠g dālan.	2. But (on) the road between Talifugo and Duy-un (there were) many people. But Gali did not see them for they were hiding near the road.

2. *ya dālan:* the road; one expects *kia dālan,* that is the article *ya* in the demonstrative relation, similarly as in *kia asén͠g dālan* at the end of the paragraph; however, names of places, especially proper names of such, are not infrequently used without a proper demonstrative particle, in Apayao as well as in other parts of northern Luzon.

adú, many, much (Ilk. *adú,* Ibg. *arú*).

tōlay: person, people (Ibg. *tōlay,* Ilk. *táo*).

madí: what is denied or disliked (Ilk. *madí,* Ibg. *marí*). Monosyllabic pronominal postpositives attach themselves in speaking to the preceding word and produce phonetic changes of different kinds; to facilitate analysis I have, as a rule, written such postpositives detached from the preceding word. Lists of Talipugo and Mahapta personal pronouns will be found in "Summary and comparative notes," following the texts.

nasin͠gen, perfect of *masin͠gen:* what is visible, what can be seen. "I see it" is *Masin͠gen ku* or, more usually, *Masin͠gô.* (Ibg. *masin͠gan,* Ilk. *makita.*)

nagsūhù, perfect of *magsūhù:* who hides; *susuhūkan:* hiding place; *Isūhù ku* or *Isūhuk ku:* I shall hide it; *Isūhuk mu di:* Hide this.

asén͠g: near; *kasén͠g ku:* person at my side.

3. Ked nu Galī timmalíb asén͠g da kayát da n͠ga say-án͠gen, n͠gem neppay kia asu na. Napia ta madí neppay key Galī.	3. Then when Gali passed near them they wanted to spear him, but hit his dog. (It was) well that they did not hit Gali.

3. *kayát:* desire, liking, volition; *Kayát ku man͠gan:* I want to eat (Ilk. *kayát,* Ibg. *ayá'*).

say-án͠gen: object of spearing, perfect *sinay-án͠g; nagsasay-án͠gan:* place of fighting with spears in the past; radical *say-án͠g:* a special kind of spear.

neppay, perfect of *ippay:* what is thrown, placed, lodged; *neppayan:* wound caused by spear or other cutting weapon (Ibg. *pay,* idea of placing or throwing anything somewhere, Ilk. *kabil*).

napia: good (of character, taste, etc.); *Napia agīna:* He is good.

4. Ey Galī nagtalaw, madī na ináx-ā-puhán asu na ta nansín͠g. Daya tōlay pinatáy da asu. Galī inumbét ko baláy da ey nebagā na key daya kabulún na n͠ga adú tōlay nan͠gilpan͠g kagīna.	4. Gali ran away, not minding his dog for he was afraid. The people killed the dog. Gali arrived at his family's house and told his companions that many people had ambushed him.

4. *nagtalaw*, perfect of *magtalaw:* who escapes; *makitalaw:* who joins others in running away.

ináx-ā-puhàn (phonetics not quite clear; the sound represented by *x* vacillated between a velar and a laryngeal fricative), stated to be the perfect of *apūhan:* object to be cared for; *Apūham apuy*: Look after the fire.

nansin͠g, perfect of *mansin͠g:* who is afraid (Ibg. *massin͠g*, Ilk. *mabutén͠g*).

pinatáy, perfect of *patáyen:* object of killing; *ipatáy:* instrument of killing; *mamatáy:* who kills; *papatáyan:* any part of the human body the wounding of which by spear or head ax is apt to cause death (also *kapatáyan* is thus used); *agmatmatáy:* who is dying; *natáy:* dead.

inumbét or *linumbét*, perfect of *umbét* or *lumbét:* who arrives, comes; *linumbétan:* place where arrival was made; *Alalbét Huán:* John has just arrived (Ibg. *labbé*‘, Ilk. *datén͠g*).

ko baláy da: to or at or in their house; also *kia baláy* might be said; the possessive pronoun *da*, their, characterizes the house as being that of Gali and his family.

nebagá, perfect of *ibagá:* what is told; the following *na* changes the stressed final *á* to long *ā*.

kabulún: companion (Ibg. *kavulún*, Ilk. *kakuyog, kabbaláy*).

nan͠gilpan͠g: who has been in ambush; *nan͠glappan͠gan:* place where an ambush was made.

5. Daya kaílian ne Galī kayát da n͠ga umén͠g da bumâles. Madī da ammo awâ kapannān da, n͠gem Baydan yan na n͠ga: "Mapén tadá ko Dumadāga ta ammò n͠ga kabdén͠g me agīda. Gabbáen tadá lāman͠g ya beddén͠g."

5. The town mates of Gali wanted to go to take revenge. They did not know where to go, but Baydan said: "Let us go to Dumadaga although I know they are our partners in a peace treaty. Just let us break the treaty."

5. *umén͠g:* who goes, perfect *immén͠g*.

bumāles: who takes revenge, perfect *bimmāles. Nebāles ku amá:* I have revenged father. *Makibāles kayú:* Join in our revenge.

ammo: knowledge; *ammò:* my knowledge; *ammom:* thy knowledge; *ammō na:* his knowledge.

awâ: where; *Awâ baláy mu?* Where is thy house?

kabdén͠g: party to a *beddén͠g*, or peace treaty, marked in the rancherias concerned by a big festival called *paspû*. Compare Ilk. *boddón͠g:* exchange of one thing for another without any premium on either.

6. Talipūgo tōlay napén da nan͠gn͠gayaw ko Dumadāga. Adú agīda mapén non-onna íssa algaw sekūha daya dadūma naggannūkat. Inumbét da ko Dumadāga pasun͠gānay tahaút anû.

6. The Talifugo people went on a head-hunting raid to Dumadaga. Many of them went in advance one day before the others started. They arrived in Dumadaga at the time of the first cock's crow.

6. *nañgñgayaw*, perfect of *mañgñgayaw:* who goes on a head-hunting raid; *ñgayawan:* place to be raided, perfect *ñginayawan.*

sekūha: before.

naggannūkat, perfect of *maggannukat:* who departs; *naggannukātan:* place where start was made.

pasuñgānay tahaút anû: the first crowing of cocks; *pasuñgānay:* the first time. *Awâ iñgñgem nagpasuñgānay?* Where did you pass the first time? *anû:* chicken.

7. Nasiñgen da apuy allam naya baláy. Ked nu nasiñgen da apuy naghohóñgos inumnà kia baláy. Odaw ñga uliteg ko non-onna inumnà kia baláy. Odaw nasiñgen na ya lalāki matūdug. Ked nu nagì-nā na daya tōlay nilumnà nalukág.

7. They saw fire inside a house. Then, when they saw the fire, they rushed to enter the house. Odaw, my uncle, was the first to enter the house. Odaw saw a man sleeping. Then, when he heard the people entering, he awoke.

7. *allam naya baláy; allam:* inside; *naya baláy:* of the house; further on *kia baláy:* to the house; *ya baláy* may mean "the house" or "a house;" for the plural compare: *daya tōlay, naya tōlay, ki daya tōlay;* for a form like *bábalay:* houses, the article was stated to take the forms: *daya, naya,* and *kia bábalay (bábbalay?)*, there being, however, some uncertainty about the latter statement.

naghohóñgos, perfect of *maghohóñgos:* who rush; *naghohoñgôsan:* place invaded with a rush.

inumnà, stated to be an alternative of *nilumnà*, perfect of *lumnà:* who enters. *Ilnà mu di:* Take this inside with you. *Nelnà ku:* I have taken it inside.

ya lalāki matūdug or *ya lalāki ñga matūdug:* a man who sleeps.

nagì-nā na: his audible thing in the past; *magì-ná:* what is audible; *maggì-ná:* who listens; *Gì-nan mu:* Listen to it. *Ginì-nà:* I have heard it (Ibg. *magginna:* who hears, Ilk. *makañgñgég*).

nalukág, perfect of *malukág:* who awakes (Ibg. *lukág*, idea of awaking).

8. Ñgem Odaw ni-nā na siñgal na, neppay kia sináy na. Odaw madī na nasiñgen ya babáy aséñg naya dapúg. Odaw immūlug, yan na: "Pinatáy ku! Pinatáy ku!" Daya dadduma tōlay inúmsil da.

8. But Odaw threw his spear; he lodged it in his belly. Odaw did not see a woman near the fireplace. Odaw came down from the house, saying: "I have killed one! I have killed one!" The other men were filled with envy.

8. *nì-nā na:* object thrown by him. *Ì-nam ko sináy na:* Throw at his belly. *Awâ pan͠gì-na-à?* Where shall I throw at? *Sináy na pan͠gì-naám:* Throw at his belly (lit. "His belly be the place of your throwing").

sin͠gal, general term for spear of any kind.

immūlug, perfect of *umūlug:* who descends from a house (usually by the stair. As a matter of fact in this case the sides of the house had been cut open by the raiders. Ibg. *ulúg*, Ilk. *úlug*, idea of descending.)

inúmsil, perfect of *úmsil:* who envies; *asīlen:* object of envy, perfect *ínsil* (Ibg. *passíl*, envy).

9. Napén da allam baláy; Alin͠góg pinatáy na ya babáy asén͠g dapúg. Maggay ey Bulawat magwagi da. Maggay pinatéd na ya bù-law naya lalāki. Bulawat pinatéd na pe bù-law naya babáy. Dadduma nagsamsam da ko gūsi, lembubú ey adú nadumdumma n͠ga bun͠got.

9. They went inside the house; Alin͠gog killed the woman near the fireplace. Maggay and Bulawat were brothers. Maggay cut the neck of the man; Bulawat likewise severed the head of the woman. The others plundered jars, switches, and many different kinds of beads.

9. *magwagi:* who are brothers or sisters (Ibg. *wagí*, brother, relative).

pinated, perfect of *putdén* or *patdén:* what is cut across, beheaded; *mamatéd:* who beheads, perfect *namatéd* (Ibg. *futúl*, idea of beheading; Ilk. *púted*, idea of cutting across).

bù-law: neck (Ibg. *vulláw:* neck, throat, Ilk. *bukláw: glutton*, Inib. *bukdow*, neck).

gūsi: glazed earthenware jars of Chinese origin and great age, the family treasure of the wealthy among the mountain peoples.

lembubú: switches worn by both men and women, generally made of the owners own dead or cut-off hair, and wound into the living hair as an adornment.

bun͠got: beads (another family treasure among the mountain dwellers of northern Luzon).

10. Ked nu nagawíh da nagan͠gwā da ko patūn͠g. Dūa būlan timmalíb gubérnador inumbét ko Talipūgo ta immén͠g da pinanutnūtan. Ked nu inumbet da ko Talipūgo din͠gkat da n͠gammin daya tōlay.

10. Then, when they returned they made a day of general rejoicing and feasting. Two months having passed, the governor came to Talifugo and they proceeded to make an investigation. Then, when they arrived in Talifugo they called together all the people.

10. *nagañgwa,* perfect of *magañgwa,* stated to be an alternative form of *mañgwa:* who makes; *kwaen:* object of making, perfect *kiñgwa:* what has been made (Ibg. *kwa,* idea of doing, making).

patūñg (*patuuñg?*)*:* festival in celebration of a successful head-hunting raid; after this festival no work is done for five days, a spell called *kanyaw,* the violation of which exposes a person to sickness.

gubérnador, there being no *r* in this dialect an Isneg less civilized than my informant would pronounce *gubélnadol;* so also, further on, *pelesidente* for *presidente.*

pinanutnūtan, perfect of *panutnūtan:* investigation; *nutnūten:* what is to be followed, as, for instance, footprints on the ground.

diñgkat, perfect of *dakāten:* who is called or invited to a gathering; *magdakkát:* who calls together by going from house to house.

11. Ked nu daya tōlay nabunbunuñg gubérnador nebagā na ki daya tōlay kantam ta nañgñgáyaw da. Daya tōlay timbag da ñga ya presidente da madī na nebagá kagida ñga gubérnador masadút kia mañgñgáyaw.	11. Then, when the people were assembled in files, the governor asked of the people why they had gone out head hunting. The people replied that their presidente had not told them that the governor was opposed to head hunting.

11. *nabunbunuñg,* perfect of *mabunbunuñg:* who are assembled in files; *nagbunbunuñg:* who have been placing themselves in file; *gabunbunuñg da:* they are placing themselves in file; *nagbunbunuñgan:* place where an assembly was made.

timbag, perfect of *tabagen:* what is given as answer (Ibg. *itabbag,* what is answered).

12. Ne gubérnador nebagā na ñga: "Nagan namatáy kia tōlay?" Odaw yan na: "Īyô namatáy kia lalāki." Aliñgóg yan na pe agīna namatáy kia babáy.	12. The governor asked: "Who killed the people?" Odaw said: "I killed the man." Aliñgog said also that he was the killer of the woman.

12. *nagan* or *ñgagan:* name; *nagan* is also interrogative: who? what? *namatáy kia tōlay,* note the construction of the "nomen agentis" *namatày,* killer, with *kia,* and compare *hummatañg ka abuy* in notes to Text III, section 3. Instances of the same construction occur in other parts of these texts.

13. Maggay ey Bulawat yan da: "Ikamí magwāgi namatéd kia bù-law da." Ne gubérnador: "Nagan nañgipañgūlo	13. Maggay and Bulawat said: "We brothers cut their necks." The governor: "Who acted as leader to you?" Bay-

kikayú?" Baydan yan na n͠ga: "Īyô." Ne gubérnador kagīen na n͠ga: "Mabālud kayú n͠gammin."

dan said: "I." The governor said: "You are all prisoners."

13. *nan͠gipan͠gūlo,* perfect of *man͠gipan͠gulo:* who acts as *pan͠gulo* or headman, leader.
kagīen: what is said, perfect *kināgí; makagí:* who speaks. *Nagan kagī na?* What language does he speak? (Ibg. *kagí,* Ilk. *saó* word.)
mabālud: who is bound, a prisoner.

14. Daya tōlay yan da n͠ga: "Awán liwat da ta ya presidentē da madī na nebagá kagīda," n͠gem gubérnador: "Ya presidentē nu mabālud pe, umén͠g kikayú ko Tawit." Ked nu masahu napén da n͠gammin ko Tawit.

14. The people said: "They are not guilty for their president did not tell them," but the governor: "Your president is also arrested, he will go with you to Tauit." Then, next morning, they all went to Tauit.

14. *awán:* there is not (Ilk., Ibg, *awán*).
liwat: guilt, fault (Ilk. *liwat,* Ibg. *liwaʻ*).
Tawit, on the Abulug River, was up to about 1915 seat of the subprovincial government which was then transferred to the more centrally located Kabuhaw (Cabugao). The word *Tawit* is found also in the name of a large group of people occupying mainly the rural parts of southern Cagayán and calling themselves *Itawit,* which name, according to a certain phonetic law of Ibanág, becomes in this dialect *Itáwì.*

15. Dūa būlan dan ko Tawit yan da n͠ga: "Magtalaw tadá!" N͠Gem natkém da manín ey nipapén da Buntô. Natágtagissá da n͠ga natáy, issá Odaw nagawíh ko Talipūgo.

15. Two months they were already in Tauit (when) they said: "Let us run away!" But they were caught again and made to go to Bontoc. One by one they died; alone Odaw returned to Talifugo.

15. *dūa būlan da:* literally: "two months their" to which is added in the text *n* = already.
natkém, perfect of *matkém:* who or what is caught; *tà-men:* object of catching; Catch him : *Tà-mem* or *Tà-men mu.*
nipapén, compare note to *napén* in section 1.
natágtagissá, perfect of *matágtagissá:* one by one; *magdudūa:* two by two.

16. Issa n͠ga būlan na ko Talipūgo, gubérnador yan na n͠ga: "Ikáw, magpresidénte ka." Timbag ne Odaw: "Madì kayát ta nabāludà ey daya kabulún madī da nad kúxkuhugén."

16. One month he (Odaw) had been in Talifugo when the governor said: "You, you take the office of president." Odaw's answer was: "I do not want to because I have been a prisoner and the townmates might not obey me."

16. *nabāludà:* was-prisoner-I.
nad expresses possibility; *natáy nad:* he is perhaps dead.
kúxkuhugén, reduplicated form of *kuhugén:* who or what is obeyed; perfect *kinuhúg; x* represents the velar fricative (Ibg. *kurúg:* idea of believing, assenting).

17. Yan ne gubérnador: "Uhay laman͠g, nu madī da ka kúxkuhugén ibagám kīyô." Odaw: "Panda uhay mu, n͠gem nu awád magì-nà dakê kagí kīyô, patayô."

17. The governor said: "Never mind, if they will not obey you, tell it to me." Odaw: "According to your will, but if there are heard by me bad words against me, I shall kill the person."

17. *uhay lāman͠g,* an idiomatic expression deprecating direct action and insinuating that things be left to work themselves out at their will. Compare *uhay* in the next sentence meaning "will and pleasure" (Ibg. and Ilk. *uray*).
panda, in Ilk. "consecutively without leaving over anything."
awád: there is, there are (Ilk. *addá,* Ibg. *uwád, egga*).
magì-nà: audible-thing-mine; second person *magì-nam;* third person *magì-nā na.*
dakê: bad; *kadakēkan:* badness; also *dakes* is in use (Ibg. *dàkay,* Ilk. *dàkes*).
kagí: word, language; *kagkagí:* words of many persons; compare *kagien* under notes to section 13.
patayô: killing-object-mine; also *patayen ku* is in use, but the former was stated to be preferable. This answer was but calculated to avoid being made president ("burgomaster").

18. Ne gubérnador: "Madím patayen, n͠gem ibagám kīyô." Daya tōlay kayát da pà-nen͠g Odaw n͠ga presidente ey namiddua n͠ga nagpresidente.

18. The governor: "Do not kill anybody but tell it to me." The people liked very much having Odaw as president and he twice officiated as such.[6]

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[6] The governor repeatedly cited in this text and upon whom devolved the task of correcting the appalling views held in regard to the taking of human life by those mountaineers, was the Hon. Blas Villamor, member of a prominent Ilocano family of Abra.

18. *madím patayen* or *dim patayen:* "Let there be none killed by you." *pà-nen͠g:* very much; *Nophán͠g pà-nen͠g:* It is very hot.

TEXT II. FROM TALIFUGO

GAWEN

1. Íssa algaw Gawen nebagā na kia inā na n͠ga kayát na man͠gasawa. Bohâ n͠ga inā ne Gawen yan na: "Bo, n͠gem nagan kayát mo?" "Kayát ko Ābaw," yan ne Gawen.

GAWEN [7]

1. One day Gawen told his mother that he wished to marry. Boha, the mother of Gawen, said: "Yes, but whom do you like?" "I like Abaw," said Gawen.

1. *íssa algaw,* more correctly: *íssa n͠ga algaw:* one day. *inā ne Gawen:* mother of Gawen; for the remaining forms expressive of the relation in which a personal name may stand to other parts of the sentence compare: "Gawen is dead:" *Ne Gawen ey natáy* or *Natáy n͠ge Gawen;* "They said to Gawen:" *Nebagā da key Gawen.*

2. Íssa n͠ga gidgidám Bohâ napén ko Agin͠gan ta nebagá ki daya ap-apō ne Ābaw ta Gawen kayát na asawáen Ābaw. Daya ap-apō ne Ābaw yan da n͠ga: "Napía nu magasawa da."

2. One afternoon Boha went to Agin͠gan and told the parents of Abaw that Gawen wished to marry Abaw. The parents of Abaw said: "It is good that they be man and wife."

2. *asawáen:* the female party as object of marrying; *man͠gasawa:* the male who marries; *magasawa:* the two persons marrying each other.

3. Ked nu Bohâ napén nanādug binālin da agīna. Ked nu nagawíh Bohâ nebagā na key Gawen n͠ga mapén ko Agin͠gan. Ne Gawen madī na kayát megyán ko baláy de Ābaw ta madī na ammo magobhá.

3. Then, when Boha had gone to treat with the parents about the marriage of the girl she was accommodated by them. So, when she returned, Boha told Gawen to go to Agin͠gan. Gawen did not wish to stay in the house of Abaw and her people because he did not know to work.

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[7] This story is an "idōdit" (Mahapta: "idaudit"), or legend, handed down from the old people. For some reason the scene is laid in the "untû," or sky-world, at a place called Dudun͠gan. The persons are Gawen and his mother Bohâ of Dudun͠gan, and Ābaw, a girl of the wealthy class of people called "bà-nan͠g," of the neighboring Agin͠gan. Story-tellers sometimes change the name of Gawen to Dēmun͠gan, that of Abaw to Damōlin͠gan.

3. *nanādug*, perfect of *manādug:* who makes or arranges those gifts (called *béllay*) to the parents of a girl which are meant as a *tādug* or gift "propter nuptias."

bināl̄in, perfect of *balinén:* who is accommodated, what is agreed to, concluded (Ibg. *balín:* idea of finishing something by perfecting it; Ilk. *balín:* idea of being able, of what is possible).

megyán (stated to be an alternative form of *magyán*): who stays in a place; *megyánan:* the place where one stays (Ibg. *gyán:* place where one finds himself, *magyán* or *maggyán*, who dwells; Ilk. *yan, agyán:* same meanings).

baláy de Ābaw: house of Ābaw and her people; "house of Ābaw" would be: *baláy ne Ābaw*.

magobhà: who works, worker; perhaps from Sp. *obra:* work. Compare Inib. *ubdà:* work.

4. Ñgem Ābaw madī na pe kayát n͠ga megyán ko baláy de Gawen. Gawen nakagumán n͠ga mapén ko baláy de Ābaw. Ked nu inumbét ko baláy da madī na ammo kūwaén na.

4. But Abaw too did not like to stay in the house of Gawen and his family. Gawen was obliged to go to the house of the family of Abaw. Then, when he arrived in their house, he did not know his work.

4. *nakagumán:* was obliged; radical *kagumán*, which in Ibg. denotes obligation, force, effort. Compare under section 10: *kinagumán*, perfect of *kagumanen:* who is forced.

kūwaén na: his work. The position of the husband and the wife depends, among the Isneg as elsewhere, upon the respective wealth of the contracting parties; compare Text I, section 10, notes: *nagan͠gwa*.

5. Íssa n͠ga algaw awán da n͠ga danúm. Ābaw nebagā na key Gawen n͠ga umén͠g magsàdú. Gawen madī na ammo kūwaén na, n͠gem napén lāman͠g ta mal-alyaw. Ked nu inumbét ko wan͠gag awán na n͠ga pagipayan kia danúm.

5. One day they had no water. Abaw told Gawen to go and fetch water. Gawen did not know what he was to do, but went anyhow for he felt ashamed. Then, when he arrived at the river, he had nothing to use as a container for the water.

5. *magsàdū;* prefix *mag-* forms both "nomina agentis" and "nomina actionis:" Who fetches water? *Nagan ya magsà-dū?* It is difficult to fetch water: *Nasulít ya magsà-dū.* For the radical *sà-dū* compare Ilk. *sakdú:* idea of fetching water, especially for drinking.

mal-alyaw: who is ashamed; *Nagan kal-alyaw mo?* Why are you ashamed?

pagipayan: place or container into which something is put; *Nagan ippay mo?* What are you going to put? *Payam pikám:* Put some more.

6. Mal-alyaw n͠ga lumbét ko baláy da nu awán ālà na n͠ga danúm. Napén kia íssa n͠ga tendáan n͠gimmina ko lūbid; ked nu nagawíh napén ko wan͠gag manín, pinutputéd na ya lūbid ta kayát na n͠ga galūtan ya danúm, n͠gem madī na magalūtan.

6. He was ashamed to arrive at their house if he could get no water. He went to a certain shop to buy string and when he went back again to the river, he cut up the string into many pieces as he wanted to tie up the water, but it could not be tied by him.

6. *āla na:* his object of taking; one would expect a form **alaen* (thus in Ilk.) with a perfect **ināla* (as in Kabuhaw); the perfect of *ālà* is, however, *nālà.* Compare farther on *makaāla:* who is able to fetch.

tendáan: shop; probably from Sp. *tienda,* shop, Tag. *tindahan.*

pinutputéd, perfect of *putputdén:* frequentative form of *putdén:* what is cut up (also *patdén* is said). Compare *pinatéd* in notes to Text I, section 9.

magalūtan (radical *galut*)*:* what can be tied, what is "tiable;" with prefix *ma-* expressing possibility are similarly formed: *masin͠gen:* what can be seen, is visible; *makán:* what can be eaten, is eatable; *makagtú:* what can be carried, and many others.

7. Dákes pà-nen͠g an͠ges na nu madí makaālà ko danúm. Podpodnúen na nagan kuwaen na. Gawen napén nammét ko bulu ked nu inumbét ko wan͠gag sinisì-lat na ya bulu ey inahipán na.

7. His mind was very much disturbed when he could not get water. He reflected what he should do. Gawen went to get some bamboo and when he arrived at the river, he split the bamboo into sticks and cut these into sharp points.

7. *dakes pà-nen͠g an͠ges na:* literally: "bad very much mind his" meaning: he was very sad; the original sense of *an͠ges* is "respiration," which is also that of Ibg. *an͠go'*, Ilk. *an͠ges.*

podpodnúen: object of trying to hit the right solution; perfect *pinodpodnú;* compare Ilk. *pudnó:* truth.

nammet, perfect of *mammet:* who fetches.

sinisì-lat perfect of *sisì-laten,* object of splitting repeatedly.

inahīpan, perfect of *ahīpan,* object of cutting to a point.

8. Kayát na n͠ga dawisen ya danúm n͠gem madī makaālà.

8. He wanted to pick up the water with the pointed sticks

Madī na kayát magawíh ko baláy da ta mal-alyaw. Ābaw tontōnan na pēyen͠g agīna. N͠gem nu gabí, Gawen madí pikám inumbét.

but he could not get it. He did not like to return home as he was ashamed. As for Abaw, the object of her waiting all the time was he. But by night Gawen had not yet arrived.

8. *dawisen:* object of picking up with something pointed.
tontōnan: who is awaited; *magtón:* who awaits.
peyen͠g: continuously, all the time.

9. Ābaw naglidug, kin͠ggaán na n͠gammin daya lalaki ko asen͠g baláy da ta umén͠g da sapūlen Gawen. Ābaw nebagā na ki daya lalaki n͠ga Gawen napén ko wan͠gag kittu sassahu. Daya lalaki napén da n͠gammin ko wan͠gag ay simmà da ne Gawen.

9. Abaw was filled with fear; she called all the men near their house to go and search for Gawen. Abaw told the men that Gawen had gone to the river that morning. The men went all to the river and they saw Gawen.

9. *naglidug,* perfect of *maglidug:* who fears.
kin͠ggaán, perfect of *kaggaán:* who is called to come.

10. Nebagā da key Gawen: "Kantam madī ka magawíh?" "Mal-alyaw-à ta madī makaālà ko danúm," yan na Gawen. Yan da n͠ga: "Mapén tadán ta gabíyin." Gawen madī na kayát umén͠g kagīda, n͠gem kinagumán da. Ked nu inumbét ko baláy da, Ābaw inelaln͠gán na Gawet; yan na: "Ikáw, awán am-ámmom! Madì kayát ikáw n͠ga asawà; napía nu magadī ta."

10. They said to Gawen: "Why do you not come back?" "I am ashamed for I am not able to fetch water," said Gawen. Said they: "Let us go then for it is already night." Gawen did not want to go but they forced him. Then, when they arrived at their house, Abaw scolded Gawen; she said: "You, you do not know anything! I do not want you as my husband; it is better that we separate."

10. *kinagumán,* see *nakagumán* under section 4.
ineláln͠gan, perfect of *aláln͠gan:* who is scolded; *magàlan͠g:* who scolds.
magadī: who separate, or withdraw from an agreement (Ilk. *agadí,* retract).
am-àmmom from *ámmo:* knowledge and *mu:* thy, the reduplication of the first syllable of *ámmo* giving a frequentative sense and thus lending force to the reproach expressed by *awán:* there is not. Compare *ámmo* under notes to Text I, section 5.

11. Tuya Gawen magawíh ko baláy naya ap-apō na ko Dudun͠gan. Mebagā na ki dayà ap-apō na: "Ābaw madī na kayát iyô.—

11. Therefore Gawen went back to the house of his parents in Dudun͠gan. He announced to his parents: "Ābaw does not want me."—

TEXT III. FROM MAHAPTA

RAN͠GÁT SE KADÁW

RAN͠GAT AND KADAW

1. Ran͠gát, Ikumaw, mapán péyan͠g ka Kà-bun͠gaw. No mahúlli, Ran͠gat mapán ka balay ni Kadáw ka Palītaw. Ya atawa ni Kadáw mahisīsam da. Si Kadáw kaskasisinnā na da; madī na malù-sáw.

1. Ran͠gat, a man from Kumaw, used to go to Kà-bungaw. When he returned, he went to the house of Kadaw in Palitaw. The wife of Kadaw (and he), they smiled (at each other). Kadaw looked at them; he was not yet angry.

1. *péyan͠g:* always, frequently.
mahúlli: who returns; perfect *nahúlli; Iúlli mo kiddí:* Bring it back here. *Ulliam:* Go back the way you came. (Ibg. *tóli;* Ilk. *sublí.*)
atawa: spouse (Ibg. *atawa*, Ilk *asawa*).
mahisīsam: who smiles; *Pan͠gisīsam na;* He says (or does) that to make others smile.
kaskasisínnan: who or what is being looked at. Compare *sinnan* under section 7.
malù-sáw: who is angry; *kalù-sáwan ko:* object of my dislike, I do not like it; perfect *kinalù-sáw ko.*

2. Kani pagmākat pinagkilóson da Ran͠gát. Kani mabālin nan͠gan, napán nin. Isa algaw Ran͠gát inumbét manín. Napán ka balay ni Kadáw Kamakim-umōman kia atawa ni Kadáw. Kani mabālin da mahúm-umōman Ran͠gát napán nin.

2. The next morning they gave Ran͠gat breakfast. When he had finished eating he just went away. One day Ran͠gat came again. He went to Kadaw's house to converse with Kadaw's wife. When they had finished talking Ran͠gat went away.

2. *pinagkilóson,* radical *kilóson:* breakfast. *Magkilóson ka:* Take your breakfast.
makim-umōman (possibly from * *maki-umumōman*): who converse. *Nahan pahum-umōmanan nu?* What are you conversing about? *Pahum-umōmanan* and the following *mahum-umōman* indicate the change of prefixes *pag-* and *mag-* to *pah-* and *mah-* before a vowel.

3. Si Kadáw madī na pikám malù-sáw. Kani isa būlan nagtāpus Ran͠gát napán huma-

3. Kadaw was not yet angry. When one month had passed, Ran͠gat went to buy pigs in Kà-

tañg ka abuy ka Kà-buñgaw. Ni Kadáw ammō na manín ñga magsībal ka balay da.

buñgaw. Kadaw knew that he would stop again at their house.

3. *nagtāpus*, perfect of *magtāpus:* what finishes.
humatañg: who buys, buyer; perfect *himmatañg; ihatañg:* money as instrument of buying; *hatañgan:* what is to be bought, perfect *hinatañg*. Note here, as in other instances, the use of demonstrative *ka* after a nomen agentis (*humatañg ka abuy*) as against the associative relation used in such cases elsewhere; for example, in the equivalent Tagalog *bumili nañg babuy*.
ammo: knowledge; compare notes to Text I, section 5.
magsībal: who stops on his way at a house; one who intends to leave an object at a certain house, and recover it upon his return, would say: *Sibālan ko yaní:* Object of my stopping will be this. One who is to take along an object for leaving it at a place where he is to stop, would be told: *Isībal mo yaní:* Motive of your stopping be this.

4. Binō na ya an-anâ na si Sekel se katayug na ni Mù-log ñga mamtát kaleggi ni Rañgát beñga umbét. Datu dūa ñga napán namtát. Kani mahúlli da neppay da ya uwáy kia linuñg naya balay. Rañgát di na pikám inumbét.

4. He ordered his son Sekel and his brother-in-law Mu-log to cut and bundle rattan before Rañgat arrived. Those two went to cut rattan. When they returned they placed the rattan into the space under the house. Rañgat had not yet arrived.

4. *binō*, probably from *binón*, perfect of *bōnan:* who or what is ordered; *bōnan ni gobierno:* order of the government.
mamtát: who cuts and bundles rattan; perfect *namtát*. *Tattatán mo:* Cut that (said of something fastened, as with a string).
neppay, see this under notes to Text I, section 3.
linuñg: space under the house; compare Ilk. *linoñg:* shelter, shade, dusky place.

5. Agpapaso isa tōlay ummáñg ñga mañgibahá ki Kadáw ta Rañgát adanní kia balay. Kadáw rinù-rut na ya dūa ñgoyon uwáy; napán kia tatà-patán maniwsiw .

5. At the midday meal a man came who told Kadáw that Rañgat was near the house. Kadáw pulled out the two bundles of rattan; he went to the *tatà-patán* to shave the rattan.

5. *mañgibahá:* who tells something. *Makibahá ka agīna:* Communicate it to him.
adanní: near (Ibg. *aranní*, Ilk. *adaní*).
rinù-rut, perfect of *rù-rutan:* what is pulled out.
ñgoyon: bundle; compare Ilk. *uyon:* a certain amount of bundles of rice.

tatà-patán, may refer to a path near the house, or to the river bank which for these riparians is a place of frequent passage, of work, play, and other community life.

maniwsiw: who shaves rattan (which may include splitting it). *Nanniwsiwan:* shaving place for rattan. *Iddí paniwsiwan nu:* This is to be the place for your shaving rattan.

6. Rañgát inumbét kia hayān, ni Kadáw. Kadáw ibahā na ñga mahāpog. Rañgát nā na: "Awán būa ko." Kadáw umūnè kia būa mañgnamát ka dūa bukál. Niddē na kia Rañgát. Rañgát nagtuháw.

6. Rañgat came to where Kadáw found himself. Kadaw asked him for (or: proposed to him?) a chew of betel. Rañgat said: "I have no areca nut." Kadaw climbed an areca palm to get two nuts. He gave them to Rañgat. Rañgat sat down.

6. *hayān* (Talifugo *giyān*): place where somebody or something finds himself or itself (Ibg. *gián*, Ilk. *yan*).

mahāpog: who prepares, for chewing, a leaf of *Piper betle* (*háwad*) by coating it with lime (*āpog*) and coiling it, folded up, round a piece of areca nut (*būa*), the plug thus obtained being called *inapūhan*.

awán: there is not; compare notes to Text I, section 14.

nā na: lit. 'say his;' *nan ko:* my say; *nā mo:* thy say; *nā nu:* your say; *nan da:* their say.

umūnè: who climbs, perfect *immūnè*. *Paunékam* (from **paunékan mo*): Cause him to climb (Ibg. *umuné*^{k}, Ilk. *umúli*).

mañgnamát: who gets or takes; perfect *nañgnamát*. *Innaya namát kia lapis ko?* Who has taken my pencil?

bukál, a general term for round things.

niddē: see *iddē* under section 10.

7. Kani sinnan dadāya nasiñgan ni Kadáw ñga awád kōman nasid-dug. Ibahā na key Rañgát ñga sinnan na. Rañgát di na kurkurúhan. Kadáw nalù-sáw. Lummipút ka likúd na, sinapgūtan na adág ni Rañgát kia aliwa na. Rañgát nitayag na ya īma na, sinañgpát manín ni kadáw.

7. When looking up river Kadaw saw that there was a field that was burning. He told Rañgat to look at it. Rañgat did not pay attention. Kadaw was angry. He went round to his back and cut through Rañgat's back with his head ax. Rañgat raised his hand, it was severed also by Kadaw.

7. *Sinnan* and *siñgan* (radical of following *nasiñgan*) appear to refer the first, to "looking," and, the second, to "seeing." *Pian ko no masiñgan ko Manila:* I should like to see Manila; *Kaskasinnan ko ya bantáy:* I am looking at the mountain. (Ibg. *sinnan* and *siñgan*, Ilk. *kíta*.)

dadāya may mean "up river" or "up country;" in southern Apayao *dāya* generally means "west," in Ilocos "east," while *ziraya* in Itawit means "south" or "up river;" people to whom the southern Apayao are western neighbors call these *Dadaya;* people living in the west are for the southern Apayao *Namindaya,* although they have hardly any neighbors in that direction until the Itíneg on the other side of the Cordillera are reached.

koman: field cleared by burning underbrush and wood (Ibg. *koman, umá,* Ilk. *umá*).

nasiddug, perfect of *masiddug:* what is on fire.

kurkurūhan: who or what is obeyed; *Kinūrug ko ya kinahī mo:* I have obeyed what you said. *Dim kurūhan:* Do not obey him. (Compare *kúxkuhugén* of Text I, section 16.)

lummipút, stated to be perfect of *lumipút:* who goes round. *Lipūtan ko kadanan ko ka abút:* I shall surround my field with a fence; perfect *linipūtan.*

sinapgūtan: what has been cut through. *Sapgūtan mo ya adīhi:* Cut through the post (giving full swing to the ax).

aliwa: general term for head ax; in this instance the special kind called *badán͠g* was used as shown in Worcester, "The non-Christian tribes etc.," Plate 60 fig. 1, *f.*

sinan͠gpát, perfect of *tan͠gpātan:* what is severed.

8. Kani mabālin na kintáb Ran͠gát mapán kia hayan naya atawa na se nanā na: "Bāsul mo yan, bāsul mo." Ya atawa na madī na mahūni. No mahūni, Kadáw itán͠garamrám na.

8. When he had finished cutting up Ran͠gat, he went to where his wife was and said: "That is your fault, your fault." His wife did not speak. If she had spoken, Kadaw would have killed her also.

8. *kintáb,* perfect of *kà-bán* (from *katbán?*): what is cut up; *man͠gtáb:* who cuts; *magkat-katáb:* who cut each other.

mahūni: who speaks; the people call their language *ūni me:* our speech.

itan͠garamram, the exact meaning of the evident stem *tan͠garam* could not be ascertained; the latter is perhaps related to Talipugo *itahám:* what is included or joined.

9. Kani mabālin na kokōni, Kadáw nagsapúg ka taggád; nisabát na katayug na ni Apūlog. Ibahā na n͠ga bāsul ni Apūlog. Ni Apūlog nā na n͠ga: "Akkán bāsul ko." Kani daddán inumbét manín ni Mahanat, kadubdub ne Kadáw.

9. When he had finished speaking, Kadaw went out into the yard; he accidentally met his brother-in-law Apulog. He said that it was the fault of Apulog. Apulog said: "It is not my fault." By and by there arrived also Mahanat, Kadaw's neighbor.

9. *kokōni; kokonīan:* object of speaking, of conversation; perfect *kinokōni.*

nagsapúg, perfect of *magsapúg:* who goes outside: *Isapúg mo:* Take the object outside. *Nisapúg kon:* I have already taken it out.

nisabát, stated to be perfect of *misabát:* who is party to an accidental encounter.

akkán: no, not (Ibg. *ekkən*, Ilk. *saán*).

10. Kadáw nā na manín n͠ga bāsul ni Mahanat. Mahanat nalùsáw, nā na n͠ga: "Dim iddē kiyâ ya bāsul mo." Ran͠gát awád pikám bittí biag na. Ni Mahanat inagtû na ka balay da.

10. Kadaw said again that Mahanat was to blame. Mahanat became angry, he said: "Do not put on me your fault." Ran͠gat had yet a little life left. Mahanat carried him to their house.

10. *dim* (from *di mo*) *iddē:* "Not thy object of giving" (to me be fault thine); perfect of *iddē* is *niddē; man͠giddē:* who gives; compare in following section 12 *niddaan*, perfect of *iddaan* or *iddān:* to whom something is given.

awád, predicates existence; compare Text I, section 17, notes.

inagtù, perfect of *agtù-an:* what is carried.

11. Kani daddán niutog da Ran͠gát ka Kumaw. Adū tōlay umunod kagīda. Kani dumatán͠g da ka Kumaw nibahā da n͠ga pinatáy da Ran͠gát. Di Ikumaw di da pikám nalù-sáw. N͠gem isa n͠ga algaw inumbét da n͠ga makiawat.

11. Afterwards they took Ran͠gat down the river to Kumaw. Many people followed them. When they arrived in Kumaw they told of their having killed Ran͠gat. The people of Kumaw were not yet angry. But one day they came to exact a fine.

11. *niutog*, perfect of *iutog:* what is taken down river (most often on a raft, *hākit*, and impelled by the current); *utōhan:* course taken down the current.

umūnod: who follows; perfect *immūnod. Unōdan mo:* Let that person (or thing) be followed by you. *Inunód ko dan:* I have followed them already.

dumatán͠g: who arrives, reaches a place; perfect *dimmatán͠g; idatán͠g:* what is taken along for somebody; for instance, provisions being brought to workmen on the road.

di Ikumaw, equivalent to *daya Ikumaw.*

pinatay, perfect of *patayan*, object of killing.

makiawat: who asks for payment, perfect *nakiawat; awatán:* what or who is to be paid. *Awatám:* Pay that. Compare Ibg. *awaʻ:* fine; also: giving.

12. Daya tōlay ka Palītaw niddaan da ka hupōhop hūsi. Datu Ikumaw inalā da ya hūsi se da la napán. Kani dua n͠ga būlan nagtapus di Ikumaw inumbét da manin nituhot da ya panà-manán da.

12. The people of Palitaw gave them a jar with a broken rim. Those Kumaw people took the jar and just went away. When two months had passed the Ikumaw came again bringing along their leader.

12. *hupōhop hūsi: hūsi* denotes one of the ancient glazed earthenware jars of Chinese origin mentioned in Text I under the (general) name *gusi; hupōhop* expresses some damage to the vessel which need not necessarily have reduced its value very much.

inalā da: taken-object their; *ināla* stated to be perfect of *alà*, which may be supposed to be an indolent pronunciation of *alaan* or *alān* in which the elided sounds are replaced by a glottal check. *Alà ko:* I am going to take it. *Man͠gāla ka ka uwáy:* Fetch some rattan.

nituhot, perfect of *ituhot:* what or who is taken along (Ibg. *tulúd,* Ilk. *túgut*).

panà-manán: leader; compare Ilk. *manakmán:* judicious by nature or from childhood; radical *nákem:* prudence, good judgment.

13. Ibahā da manín n͠ga man͠galā da ka mahatút pirà. Daya Ipalītaw madī da n͠ga man͠giddē. Kahīan da n͠ga magpapatay da. Daya Ikumaw nān da n͠ga piān da nu isay-ám dadá. Kani mabalin say-ám nahulli di Ikumaw.

13. They said also they had come to get one hundred pesos. The Ipalitaw did not give (the money). They said they would fight. The Ikumaw said that they liked to make peace with them. When the peace was concluded the Ikumaw went back.

13. *mahatút:* hundred (Talifugo *magasút,* Ibg. *magatù*^{t}, Ilk. *san͠gagasút*).

kahīan: what is said; *kagkahīan,* what is frequently talked about; compare *kagien* in Text 1, section 13, notes.

isay-ám: person with whom peace is made; *say-ám:* peace; *makisay-ám:* who attends a peace gathering.

14. Ran͠gát as-asissa n͠ga la ya bayad na n͠ga hūsi. Kadáw nig-sān na ya atawa na, pinataliā na. Ya atawa na maykaddua nan͠gin, ni Hundaláy, nahan-anâ ka lima lalaki; ya

14. As for Ran͠gat, he was paid for only once; namely, with a jar. Kadáw repudiated his wife and she was exchanged by him (for another one). His second wife, Hundaláy,

isá mahas-askwela ka Trinidad.

gave birth to five males; the one is going to school at Trinidad.[8]

14. *nig-san*, perfect *of ig-san:* who is to be repudiated. *Ig-san ta ka:* I shall repudiate you.
pinatalīan: perfect of *patalīan:* what is taken in exchange for something else; *magtāli:* who changes.
nahan-anâ, stated to be perfect of *mahanâ:* who bears children.
mahás-askwēla: who is attending school; from Sp. *escuela:* school.

TEXT IV. FROM MAHAPTA

AHAMA AY AYON͠G

THE CRAB AND THE MONKEY

1. Nabayāg na dahōn Ahāma ay Ayón͠g napán da kia dappít; nituhot da bālon da. Ahāma nā na n͠ga: "Man͠gan tadá." Kadī man͠gmán͠gan da Ayón͠g awán isidā na; nahadan͠g kia bin͠gil ni Ahāma.

1. Many years ago the crab and the monkey went to the bank of the river; they took along their provisions. The crab said: "Let us eat." While they were eating, the monkey, having nothing to eat along with his rice, asked for some legs of the crab.

1. *nabayāg:* what has been of long duration; *dahōn:* year (Ibg. *dagún*, Ilk. *tawén*).
dappít: river bank.
man͠gmán͠gan, reduplication of first syllable expressive of progressive action. *Man͠gānà:* I eat; *mán͠gan da:* they eat.
isidá: cooked food eaten with rice, thus especially meat.

2. Ahāma nibahā na n͠ga madī makadālen no iddē na bin͠gil na. Si Ayón͠g kahīan na

2. The crab said that he would not be able to walk if he gave his legs. Mr. Monkey

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[8] The laconism of the preceding account suggests a few words of explanation. The repeated statement that Kadaw "was not yet angry" is to be understood evidently as meaning that he did not yet betray his anger, since his later sending away his male house-mates to cut rattan while Ran͠gat's visit is impending, his withdrawal at that time to a place outside the house, and his endeavors there to remain alone with and detain Ran͠gat clearly indicate a settled purpose. This purpose is exploded into sudden action by the rigid if not contemptuous attitude observed by his visitor, a source of irritation which is afterwards prudently avoided by Kadaw's wife. The man Mahanat was said to have stood in some relation to Ran͠gat.

n͠ga patalīan. Ahāma niddē na appat bin͠gil na kia Ayón͠g. Ahāma daddūa bin͠gil na nabansi.

said that he would give something in exchange. The crab gave four of his legs to the monkey. The crab had two legs left.

2. *makadālen:* who is able to walk; *manālen:* who walks.

3. Parpáramanā na manalen; Ayón͠g kaskasinnā na Ahāma ta ammo na n͠ga makadālen pikám. Ayón͠g nibahā na n͠ga alà na manin. Ahāma simbág na n͠ga madī makadālen. Ayón͠g nibahā na n͠ga patalīan na ka bulāwan.

3. He is trying to walk; the monkey is looking at the crab and perceives that he is still able to walk. The monkey said he would take again (of the legs). The answer of the crab was that he would not be able to walk. The monkey said he would exchange them for gold.

3. *parpáramānan:* what is being tried; compare Ilk. *ramánan:* what is tasted; *parmán:* trial, experiment.

simbág, perfect of *tabbāhan:* what is answered (Ibg. *tabbagán*, perfect *sibbág*).

bulàwan: gold (Ibg. *vuláwan*, Ilk. *balitók*).

4. Ni Ahāma niddē na bin͠gil na ta piā na di bulāwan. Kani nabālin da nan͠gan Ayóng napán ka balay na. Adī na pinatalīan ya bin͠gil ni Ahāma, ta ni Ahāma natáy kia ayan ni dappít.

4. The crab gave his legs for he desired the gold. When they had finished eating the monkey went home. He did not give anything in exchange for the legs of the crab, for the crab was dead near the river bank.

4. *piā*, probably from *pian* before *na*.

SUMMARY AND COMPARATIVE NOTES

The data contained in the foregoing analytical notes to the texts, together with some supplementary information obtained by me on the two dialects concerned, may now be summed up and be accompanied by a comparison with the corresponding forms of the two principal lowland languages of northern Luzon: Iloko in the west, and Ibanág in the east. Although these two languages are chosen for comparison partly for lack of material from the more immediate neighbors of the two Isneg dialect groups concerned, their cultural influence in the past and present upon the mountaineers of northern Luzon, which was felt by the inhabitants of Apayao to some degree also from the north, is not to be overlooked and the comparison will certainly be found helpful for gaining an insight into the linguistic composition of this part of Luzon.

PHONOLOGY

The Talipugo dialect, hereafter referred to by the sign "Tal.," is characterized by an indistinct vowel—the "pepet" of Indonesian linguistics—that was heard by me—often for the same word—as one or the other of the sounds *i, e, ə, a, œ.* The unstable pronunciation proved so puzzling that I was induced to abandon, in recording this elusive sound, the principle of writing down only what I heard, and to avoid a considerable confusion by representing that sound uniformly by *e* which, while standing for an average of pronunciation, is to be taken as a symbol for the variety of sounds just enumerated. Thus words written in the texts *n͠gem* and *beddén͠g* (I, 5) were heard also as *n͠gœm* and *bœddœn͠g; nasin͠gen* (I, 7) as *nasin͠gin; mapén* (I, 5) occasionally as *mapán,* etc. The Mahapta dialect, hereafter designated by "Mah.," although not quite free from a similar vacillation, appears to have decided for the same vowel generally on the articulation of an obscure *a.* The corresponding difference between the two dialects was most clearly observed in derivatives in *-en,* a suffix containing that indistinct sound and denoting the object directly affected by the action. Thus the object of killing is in Tal. *patayen* (I, 18), in Mah. *patayaṅ* (III, 11, notes). The relation existing in regard to the sound in question between the two Isneg dialects, Iloko, and Ibanág is seen in the following examples:

	Ilk.	Tal.	Mah.	Ibg.
Sour	naalsem	nalsem	nalsam	attam
Navel	púseg	puseg	pusag	futad
Pole	tekkén	takkén	takkán	takkán
Burial	taném	temén	tamán	tanám

This table, from which examples of certain special changes of the sound in question have been excluded, shows the Iloko standard *e* to agree approximately with the Tal. average *e,* while the Ibanág representative of the same sound finds its counterpart in the obscure Mah. *a.*

Another phonetic peculiarity to be found in the texts and this time shared by both dialects, is the elision of *k* when final or when closing a syllable before a consonant, the elided *k* being replaced by the glottal check; for example, Tal. and Mah. *anà*, child, against general Fil. *anak;* Tal. and Mah. *an-anû*, chicken, against Fil. *manúk;* Mah. *malù-sáw*, angry, agaisnt Ilk. *maluksáw;* Mah. *panà-manan*, leader, against Ilk *nanakmán*, judicious person; Tal. *bù-law*, neck, against Inb. *bukdów*, Pang. *bekléw*.[9]

The elision of certain sounds by the two dialects will require a special study in detail. It appears that the encounter also of other stops with a following consonant is avoided in Mah., while Tal. shows itself less averse to consonantal combinations of this kind; compare: Mah. *ì-log*, egg, with Tal. *eplug;* Mah. *dù-dut*, feathery down, with Tal. *dutdut;* Mah. *nà-nag*, thick, with Tal. *nagnig*. Through the elision of final *k* in conjunction with the unstableness of the indistinct vowel above first mentioned a noteworthy phenomenon is observed in Tal. in cases where a derivative in *-en* is followed by the possessive pronoun *ku*, my. Thus, for the sentence, "That person will be killed by me" or "will be the object of my killing," which in Mah. is *patayan ku*, Tal. has two forms of expression which, as my informant repeatedly assured me, are in use side by side; namely, *Patayén ku* and *Patayô* (cf. I, 17). Similarly for *masin͠gen ku* is said *masin͠gô*. A comparison of these forms shows the sound-group *-en ku* in the one to be represented by *ô* in the other. To take the first-cited *patayén ku* for demonstration, the suffix *ô* in *patayô* may be explained by assuming, in the first place, a contraction of *patayén ku* to *patayék*, a contraction quite regularly made in Iloko and other dialects for all derivatives in *-en* when followed by *ko*. This *patayék* would thereupon have suffered the elision of final *k*, this being replaced by the glottal check which latter in its turn would have produced the conversion of the preceding stressed indistinct vowel into *ô*. To support this last sound-change reference can be made to Ibanág, though, it is true, not precisely for the example just used. In Ibanág the indistinct vowel is represented generally by a dull *a* as shown above, and to a Tal. *patayen ku* corresponds an Ibanág *patayakku*. The regular change, however, of the Ibanág pepet *a* to *ô* before a glottal check has clearly been shown by Conant, who, when commenting in his "The pepet law in Philippine languages"[10] on such Ibanág radical words as *atô*, roof; *dakô*, grasp; *alimatô*, leech; gives the corresponding rule in the following words:

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[9] In connnection with these examples it is recalled that the grave accent followed by a dash after the vowel denotes an abruptly checked pronunciation of the latter with subsequent slight hiatus; were the vowel is stressed the encounter of the gravis with the acutus leads to the use of the circumflex.

> The *o* of Ibg. *atō*^{p}, *dakó*^{p}, *alimató*^{k}[11] is no exception [to the phonetic law by which the pepet becomes *a* in Ibg.] as it regularly stands for an Ibg. *a* representing Phil. *ĕ* [the pepet] when followed by a final glottal stop (hamza) which represents one of the surd stops *k*, *t*, or *p*. . . When a suffix is added to the root, the surd stop is restored and the Ibg. *a* reappears, e. g. *ató*^{p}, with the locative suffix *-an*, becomes *attappán*, place of roof(-ing) with Ibg. doubling of original *p*.

I would point out in this connection that in Tal. as well as in Ibanág the influence exercised by the glottal check upon the nature of the preceding vowel, changing this to *o*, is not limited to cases in which such preceding vowel is the pepet as found in Tal. *patayô*, and in the Ibanág radical words just quoted from Conant. In comparing

	Ilk.	Tal.	Mah.	Ibg.
Milk	gátas	gattô or gattâ	hattâ	gattô (gattó^{k})
I (ego)	siák	iyô	iyâ	sò (so^{k}), and: sákən.

it is seen that in Tal. as in Ibg. also an original *à* is changed to *ô* by the following glottal check, and that in the first of these examples this glottal check goes back to an original *s*. True that Ibanág conventional writing testifies also in this first example to a final *k*, and that the Itawit dialect of southern Cagayán actually pronounces this final *k* in saying *gatták* (occasionally also *gattát*), the vast majority, however, of Philippino languages has *gátas*, with a secondary form *gatá* for coconut milk. (For the change from final *s* in Fil. *gátas* to *k* in Itawit *gatták* a correspondency was discovered in Text 1, 17, notes, in Tal. *dakê*, at the side of *dakes*, bad, giving the derivative *kadakēkan*, badness, which, after separating the affixes *ka-* and *-an*, leaves a stem * *dakék*.)

Of a number of other phonetic changes to be found in the texts through a comparison of the two Isneg dialects either with each other or with other Philippine languages, only a few more can be demonstrated with a sufficient number of parallel forms as supporting evidence.

The first is the change from Tal. *g* to Mah. *h* which will have been observed in the texts in those derivatives which Tal. forms with prefix *mag-* uniformly before stems beginning with consonants as well as with vowels (I, 1, *magkokopun;* II, 10, *magadí*), while Mah. changes this prefix before vocalic stems to *mah-* (III, 3, *magsibal;* III, 14, note, *mahanà*). Compare also the place-name *Mahapta* with the "*Magapta*" of outsiders. The following examples show the same change in radical words with *g* in initial and medial position:

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[10] Anthropos 7 (1912) 925.

[11] By representing the glottal check by means of a small *k*, *t*, or *p* placed against the word but raised above the line Conant imitates in a way the conventional Ibanág orthography which writes *ató-p*, *dakó-p*, *alimató-k*, etc.

	Ilk.	Tal.	Mah.	Ibg.
Root (and related meanings)	gamút	gamút	hamót	gamû (gamú')
Night	rabií	gabī	hābi	gabí
Stomach	rosok	gūsù (breast)	hūtù (breast)	gutû (gutú')
Blood	dara	daga	daha	daga
Nose	agóñg	igúñg	ihuñg	igúñg
Name	nagan	nagan or: ñgagan	nahan	ñgagan
Betel leaf	gawéd	gawed	hawad	god

The preceding examples are chosen so as to conform with those used by Conant in his "The RGH law in Philippine languages."[12] While setting forth the sound-change alreeady indicated they show that this change comprises as well the *g* of the RGH series, to which the first four examples belong, as also the *g* of the RLD series represented by the next two examples. The phonetics of Mah., which so often resemble those of Ibanág, are seen in this table in marked contrast to this language. As regards *g* in final position, it remains unchanged in Mah.; compare Tal. *apug,* lime; *iyug,* coconut; *bibig,* lip, with *apog, iyog,* and *bibig* for the same meanings in Mah. The law of the change in question comes into force, however, as soon as this final *g* is made intervocalic through affixation: Mah. *apog,* lime, but *inapūhan,* what is coated with lime (compare Text III, 6, notes).

Another important phonetic difference between the two dialects under review is the frequent passing of Tal. *s* into Mah. *t* as already to be noted in Tal. *gūsù,* breast, Mah. *hūtù,* above quoted. Other examples are:

	Ilk.	Tal.	Mah.	Ibg.
Flesh		sabbit	tabbit	tabbî (tabbí'), skin
Deer	ugsá	ugsa	ugta	uttá
Dog	áso	asu	a-tù	itu
Sugar cane	unas	unas	unat	unâ (uná')
Maggot	igges	agges	aggat	aggô (aggó')

Mah. shows here for the sound in question a similar conformity with Ibanág as Tal. does respecting Iloko. The sound change here illustrated appears, however, to be subject to exceptions that require further elucidation. For one thing, the change does not take place in Mah. before the vowel *i;* thus Tal. *masin͠gen,* what is seen; *sinag,* sun; *sin͠gal,* spear, remain also in Mah. *masin͠gan, sinag,* and *sin͠gal.* In repudiating *t* before *i* Mah. is indeed but consistent with its habit of converting original *t* into *s* whenever brought into contact with infix *-in* as seen, for instance, in III, 7, notes: *tan͠gpātan: sinan͠gpat;* and in IV, 3, notes: *tabbāhan: simbág.* A like avoidance of the combination *ti* is characteristic also of Ibanág while Tal. has no difficulty in forming of *tumalib* a perfect *timmalib* (I, 1), and of *tabagen* a perfect *timbag* (I, 11).

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[12] Jaos 31 (1910) 1.

There may finally be mentioned, the absence in Tal. of the sound *r* which occurs in Mah. as a dental in such words as *baran͠gay,* boat; *pirà,* silver; further in III, 7, in *kurūhan,* who is believed (Ibg. *kurugán*), for which Tal. has the equivalents *bahan͠gay, pihà,* and *kuhugén,* showing a substitution of *r* by *h.* In the reduplicated form *kuxkuhugén* (I, 17) of the last example this *h,* finding itself closing a syllable before *k,* is condensed to the velar fricative *x.* A similar explanation might be found for the dubious *h* of *magawih* (I, 1, notes) which may go back to some hypothetical * *magawir* (compare Ilk. *agáwid,* who returns or withdraws from the place where he went), although in this case the final *h* does not tend to become *x* but the *ç* of the International Phonetic Association, the friction being shifted to the palate by the preceding *i.*

GRAMMAR

The nouns (substantive, verbal, adjective) of both dialects bear the unmistakable stamp of the Philippine languages in general. They are either radical words of mostly two syllables (compare, for instance, the preceding tables) or are built up from such stems into polysyllabic words often of considerable length with the help of the two typical means of reduplication and affixation.

Reduplication, consisting most frequently in the anticipative doubling of the first syllable of the stem plus the consonant following, generally expresses some sort of augmentation of the sense of the stem; the action is represented as repetitive or frequentative: Tal. *putputden,* what is cut up repeatedly (II, 6); Mah. *kagkahian,* what is frequently talked about (III, 13, notes); as progressing or lasting: Tal. *tontonan,* who is awaited

(II, 8); Mah. *mañgmañgan*, who is eating (IV, 1); as participated in by many: Tal. *mabunbunuñg*, who are assembling in files (I, 11). Other ramifications of such generally augmentative significance of reduplication exist but may be left to be determined by more-detailed study.

Affixation may be illustrated by a few of the commonest instances which I select so as to exemplify what in other Philippine languages is generally considered the characteristic significance of each affix:

Prefix *mag-*, indicating one who holds a position in the sense of the stem or who is active in such sense generally, without reference to a precise object (intransitive action): Tal. *magkopun*, who are friends; *magwagi*, who are brothers; *magasawa*, who are spouses; *magpresidente*, who officiates as president; *magsuhù*, who hides; Mah. *mahuni*, who speaks; *magtuhaw*, who sits down.

Prefix *mañg-*, indicating one who executes an action habitually, professionally, or is bent upon getting something: Tal. *mañgalyug*, who trades; *mañgñgayaw*, who goes headhunting; *mañganúp*, who goes hunting with dogs; Mah. *mañgala*, who goes to fetch something; *mañgayu*, who goes for wood.

Prefix (infix) *um-*, indicating who or what is gradually moving towards an aim, is becoming something, or is moved interiorly: Tal. *umulug*, who descends a stair; *umsil*, who feels envy; Mah. *umunè*, who climbs; *umunod*, who follows; *dumatáñg*, who reaches.

Prefix *ka-* forms designations for associates in the manner of English co- in "co-worker, co-heir;" Tal. *kabdéñg*, partner to a *beddéñg*, or peace-treaty; *kabulún*, companion, from *bulún*, idea of accompanying; Mah. *katayug*, brother-in-law, *kadubdub*, neighbor are equally formed.

Pronouns.—The languages of northern Luzon are distinguished from those of the rest of the Archipelago by certain characteristics, conspicuous among which is the possession of two forms for the personal pronoun as subject of a sentence. To establish this feature for the two Isneg dialects under review, and to ascertain at the same time whether by a corresponding comparison with the two lowland languages already used above something can be gained that would lead to the recognition of a specific Isneg speech, I present in the following a full list of the personal pronouns from both dialects (compare Tables A, B, and C) together with a view of their most developed (emphatic) forms compared with Iloko and Ibanág (Table D). Table A shows that both dialects possess the double series of nominatival forms characteristic of the northern group of Philippine languages. It will be observed in the same table that, while in the postpositive nominative these dialects fully agree, they use a different prefix in forming the first four plural forms of the emphatic prepositive nominative, the remaining forms of the latter being, however, with some slight phonetic variation, identical. A like uniformity is found in the possessive forms given in Table B. The relational forms listed in Table C show themselves likewise built upon one and the same plan with the sole exception of the same first four plural forms which differed already in the nominative, although they appear here more or less reconciled by the employment of one and the same (demonstrative) element *k* as prefix to the nominative stems. Table D, finally, which shows, of course, the common general Filipino basis, makes the Isneg pronouns stand out, in spite of their internal difference already mentioned, in pronounced common contrast to the Iloko and Ibanág equivalents. This contrast betrays a specific Isneg character especially in four out of the eight forms listed; namely, in the first and third person singular, in the inclusive first person plural, and in the third person plural. This idiomatic feature remains distinct also if, for the only further comparison available, we turn to the table given at the end of my paper on "Kalinga texts from the Balbalasañg-Ginaañg group"[13] containing the personal pronouns from a western Tiñggyan and from some Kalinga dialects.

A list of the personal pronouns used in the two speech groups corresponding to the preceding texts.

A. PARADIGM SHOWING THE PERSONAL PRONOUN IN ITS EMPHATIC FORM (USED TO SET UP THE PERSON AS SUBJECT OF THE SENTENCE), AND IN ITS SHORT POSTPOSITIVE FORM.

	Talipugo.	Mahapta.
I, I am Isneg.	īyô, isnégà	īyâ, isnéggà [a]
Thou, thou art Isneg.	ikáw, isnég ka	ikáw, isnég ka
He (or she) is Isneg.	agīna, isnég	agīna, isnég
We, we are Isneg (exclusive)	ikamí, isnég kamí	dakamé, isnég kamé
We, we are Isneg (inclusive)	itadá, isnég tadá	datadá, isnég tadá
We two, we are Isneg.	itá, isnég ta	datá, isnég ta
You (plural), you are Isneg	ikayú, isnég kayú	dakayó, isnég kayó
They, they are Isneg.	agīda, isnég da	agīda, isnég da

[a] Also pronounced "*Isnággà*" which would indicate the *e* of "Isnég" to be the indistinct vowel which as a rule becomes *a* in Mahapta.

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[13] Philip. Journ. Sci. 19 (1921) 175.

B. PARADIGM SHOWING THE PRONOUN IN ASSOCIATIVE RELATION, AS "POSSESSIVE" POSTPOSITIVE.[b]

My name	n͠gagan ku	nahan ko
Thy name	n͠gagan mu	nahan mo
His (her) name	n͠gagan na	nahan na
Our name (exclusive)	n͠gagan mi	nahan me
Our name (inclusive)	n͠gagan tadá	nahan tadá
Our name (dual)	n͠gagan ta	nahan ta
Your name	n͠gagan nu	nahan nu
Their name	n͠gagan da	nahan da

[b] When the noun ends in a vowel Tal. *ku* and Mah. *ko* disappear leaving that final vowel with an abruptly stopped pronunciation followed by a slight hiatus; thus 'my father' is in both dialects *amà*. In the second person *mu* and *mo*, respectively, lose their final vowel in the same case, and the remaining *m* attaches itself to the preceding vowel, giving for "thy father" in both dialects *amám:* Talipugo uses besides this also the form *ama mu*, and others similarly. For *n͠gagan* Talipugo was said to have in use also the alternative *nagan*.

C. PARADIGM SHOWING THE PRONOUN IN DEMONSTRATIVE RELATION.

He told it	to me	Nebagā na	kīyô	Nibahā na	kiyà
	to thee		kikáw		kikáw
	to him (her)		kagīna		kagīna
	to us (exclusive)		kikamí		kadakame
	to us (inclusive)		kitadá		kadá-tadá
	to us (dual)		kittá		kadá-ta
	to you		kikayú		kadakayó
	to them		kagīda		kagīda

D. COMPARISON OF FORMS FOR THE EMPHATIC NOMINATIVE IN ILOKO, TALIPUGO, MAHAPTA, AND IBANAG.

	Ilk.	Tal.	Mah.	Ibg.
I	siák	íyô	īyâ	sò (so^{x}) sakən
Thou	sika	ikáw	ikáw	sikaw
He, she	(isú)	agina	agina	yaya
We (exclusive)	dakami	ikamí	dakamé	sikamí
We (inclusive)	datayo	itadá	datadá	sittəm
We two	data	itá	datá	sittá
You	dakayó	ikayú	dakayó	sikamú
They	ida (isuda)	agida	agida	ira

Article.—The existence of an aggregate of dialects coinciding more or less with the confines of the Subprovince of Apayao, and constituting through common grammatical and other charactertistics a nucleus of idiomatic Isneg speech, is further made probable by an examination of the article used before common nouns in the two dialects under review. This article is in both the same; namely, *ya*, and is given an employment not always congruent with that of the definite article in English:

Mah. *ya atawa ni Kadáw*, the spouse of Kadaw (III, 1);
Tal. *ya lalaki matudug*, a man sleeping (I, 7);

in the last of which examples *ya* stands for the English indefinite article.

In associative relation the Isneg article takes the form *naya:*

Tal. *allam naya baláy,* inside of the house (I, 7, notes);
Mah. *Neppay da ya uwáy kia linuñg naya balay,* They put the rattan into the ground-floor of the house (III, 4);

while in demonstrative relation the form *kia* is found, probably a combination of *ki* with *ya:*

Tal. *Odaw inumnà kia baláy,* Odaw entered into the house (I, 7);
Mah. *adanní kia balay,* near to the house (III, 5).

Comparing these regularly built forms of the Isneg article with their Iloko and Ibanág equivalents, we find:

	Ilk.	Tal. and Mah.	Ibg.
The house	ti (or: ití) baláy	ya balay	ib baláy
Of the house	ti baláy	naya balay	nab baláy
To the house	ití baláy[a]	kia balay	tab baláy

[a] Compare, The use of *ti* and *iti* in Iloko, The Archive, No. 4, Manila (1925–26).

Demonstrative particle.—The element *k* which was observed entering into the formation of the relational forms both of the article and the personal pronoun characterizes likewise the demonstrative particle in both dialects, although followed in each by a different vowel:

Tal. *Inumbét ko baláy da,* He arrived at their house (I, 4).
Mapén tadá ko Dumadaga, Let us go to Dumadaga (I, 5).
Mah. *Napán ka baláy ni Kadáw,* He went to Kadaw's house (III, 2).
Dumatáñg da ka Kumaw, They arrived in Kumaw (III, 11).

The same particles characterize in these dialects the relation between the "nomen agentis" and the object upon which the activity of the agent is directed:

Tal. *Nagsamsám da ko gusi,* etc., They plundered jars, etc. (I, 9).
Madí makaala ko danúm, He was not able to fetch water (II, 7).
Mah. *Mañgnamát ka dua bukál,* He picked two nuts (III, 6).
Nahan-anâ ka lima lalaki, She bore five males (III, 14).

Ligature.—The explanatory particle *ñga* which links an attribute to the preceding noun, and is known from both Iloko and Ibanág, is common also to both Isneg dialects:

Tal. *Kayát da Odaw ñga presidente,* They liked Odaw as president (I, 18).
Mah. *Inumbét da ñga makiawat,* They came as exactors of a fine (III, 11).

In what the two dialects distinguish themselves—and certainly not very favorably—in respect to this ligature, is the frequency of its omission, to be noted at least in the texts; it contrasts with the regular use made of the same ligature in other dialects:

> Tal. *issa algaw*, one day (I, 1), against Mah. *isa n͠ga algaw* (III, 1).
> Mah. *Ran͠gát Ikumaw*, Ran͠gát, a man from Kumaw (III, 1), against Tal. *Galī n͠ga Italipugo*, Gali, a man from Talipugo (I, 1).

LEXICON

Since the whole stock of words in use by the two dialects under review finds in the preceding texts a comparatively very much scantier representation than their systems of sounds and grammatical categories it must necessarily be a hazardous undertaking to characterize their lexicon on such insufficient basis. Any attempt, moreover, to set down certain words definitely as Isneg idioms is precluded by our complete ignorance of the speech of the peoples immediately surrounding the two dialect groups in question. An examination, nevertheless, of that part of the vocabulary which is contained in the texts justifies a few comments.

In the first place we find a stratum of words which through their occurrence—in like or slightly varied form—all over the Archipelago would proclaim these dialects as unmistakably Filipino. Choosing some such words at random from my records I quote:

algaw	day	*asu*	dog	*ina*	mother
danúm	water	*asawa*	spouse	*apuy*	fire
inúm	drink	*patáy*	dead	*lalaki*	male
dalan	road	*balay*	house	*babay*	female
bulan	month	*man͠gan*	eat	*isa, dua*	one, two

A noteworthy feature is the strikingly frequent lexical agreement between the Isneg dialects recorded and the two lowland languages which, for lack of material from more immediate neighbors, have been used for comparison. This agreement is readily gathered from the parenthetical references to Iloko and Ibanág added to the notes under the texts. It is especially remarkable in regard to Ibanág although Iloko, too, often enough shares in this agreement. A more systematic comparison would show such correspondencies to be still more numerous so that it might be asked if we have to do here with the outcome of a gradual advance of lowland culture into the mountains whereby a once more-idiomatic Isneg speech is slowly being assimilated by stronger dialects. At present there exists not only a great number of vocables that are typical for northern Filipino speech and are practically identical in Isneg and one or the other of the two lowland languages, but a phraseology belonging to every-day life comes thus into existence which belongs almost as much to the one as to the other language. Expressions like *Kayát ko mapán Manila,* I wish to go to Manila; *Awán danúm,* There is no water; *Adú balay,* Many houses; *Madí,* He does not like, and others are either entirely or very nearly as much Isneg as Iloko, while they are at the same time easily intelligible also to the Ibanág.

As regards specifically Isneg idioms they probably make up the greater part of the more-specialized terms of the texts. They may have to be looked for precisely in that part of the general lexicon which describes peculiarities of Isneg architecture, dress, implements, social and religious life, etc., since along these lines terms have been evolved that distinguish even one small group of Isneg speech from the other. Thus to a Mah. *kiloson,* breakfast, was said to correspond the Tal. localism *udma;* "at the time of the midday meal" is in the former *agpapaso,* in the latter *agnanabawan.*

CONCLUSION

As far as an opinion may be expressed upon the evidence of the preceding texts and notes, there appears to be ground for reckoning with the possibility that future more comprehensive research on the spot will establish a more or less concrete Isneg form of speech distinct from what is so far known of the surrounding dialects. Until such more complete investigation will have been made, and until the two dialect groups found by me can either be coördinated with, or be distinguished from, their linguistically still unexplored neighbors, the present contribution to our knowledge of the dialects of northern Luzon must necessarily remain in a certain sense an isolated nucleus of information. But even so, it affords an opportunity to examine briefly the place assigned by Worcester to the inhabitants of Apayao in the ethnography of northern Luzon, and to compare his findings with some general information gathered by me along linguistic lines from my Isneg informants.

In his already quoted work on the non-Christian tribes of northern Luzon, in which he laid a new fundament for the ethnography of that part of the Philippines, Worcester (p. 852) says, under the heading Tribe VII. The Tingians, the following:

> The people of the district of Apayao have long been known under the name of *Apayaos*, although their immediate neighbors call them *Kalingas*. On a recent trip through this hitherto almost unknown region I was greatly surprised to discover that they were *Tingians*, but *Tingians* with a degree of civilization comparable to that possessed by those of Abra a century and a half or two centuries ago. They themselves trace their ancestry without hesitation to the *Tingians* of Ilocos Sur, for whom they still entertain friendship and whom they often visit. They call themselves *Itneg*.

That the Isneg should have been given the name of "kalinga" by their immediate neighbors, a designation the fitness of which Worcester himself denies in a later work, is not to be wondered at since this term, with the Isneg as well as with the Ibanág and other neighboring peoples, means simply "enemy." In former times also Talipugo and Mahapta as other rancherias within Apayao were "kalinga" to each other. "In the head-hunting countries [of northern Luzon]," says Worcester (p. 798), "*rancherias* of people of the same tribe were constantly at war with each other, and the blood feuds between them were handed down from generation to generation." It has been thus evidently only through a mistaken notion of the Spaniards that the term Kalinga first came to be used as a tribal designation. As such it was given by Worcester a fixed value on the basis of common physical and cultural—but not necessarily linguistic—characteristics to a people inhabiting "broadly speaking, the eastern slopes, river valleys and foothills of the Cordillera Central from the Saltan River north to Dagara and to the vicinity of the valley of the Ablug [sic] River. * * * They are constantly at war with those of Dagara and the Apayaos district." Worcester here (p. 819) brings up the northern boundary of the Kalinga as far as Dagara and the Abulug River; he thus excludes my Talipugo or Ibahen group from the Isneg and incorporates them with the Kalinga.

How the same author came to adopt for people who, according to him, call themselves Itneg, the name Tingian or, more specifically, "wild Tingian" is explained by him (p. 852) as follows:

> The name *Tingians* or *Tinguianes* has long been applied to the non-Christian inhabitants of Abra and to certain of those of the western slopes of the eastern mountain ranges of Ilokos Norte and Ilokos Sur. These people call themselves *Itneg*, and this appellation would be a fitting

tribal designation for them, but the name [Tingian] which I have adopted has been so long and so generally in use that it seems undesirable to change it.

Worcester thus expressly recognizes that the people living on the western slopes of the Cordillera as well as those on its eastern side in Apayao call themselves Itneg. In giving names to the two dialect groups illustrated by my texts I considered it safest to distinguish them for the present by those of the chief localities where these dialects are spoken; namely, Talipugo and Mahapta. For a designation of their common linguistic features it was but natural to use the one recognized by the speakers themselves as their common appellative: Isneg or Itneg. To employ in linguistics instead of this the term Ţin̄ggyan, adopted by Worcester, would mean a subsumption in speech not justified by any existing record; compare in this regard my Tin̄ggyan text.[14]

The most intelligent of my Isneg informants, a nephew of President Odaw of Talipugo (mentioned in Text I) and who had travelled down the Abulug River and thence along the north coast to Aparri in Cagayan, stated that the Isneg of the whole Apayao district can understand each other with more or less difficulty. Having crossed also the Cordillera in going to Tineg, a town on the western slope in Abra, where his people, the Ibahen, were wont to provide themselves with pottery, he had made himself understood also by the people there. Upon my inquiry he stated that not only the inhabitants of the town called Tineg but all the neighboring people on that side of the Cordillera Central were called by his own people *Iténeg*, a designation which, although for some reason differentiated from *Itneg*, represents very probably but a fuller form of this latter. Both words embody evidently the same radical *tineg*. If this *tineg* might possibly be a variant of the old Filipino term *tin̄gge*, mountain range, I am not prepared to say. The latter is recorded from as early as 1576 when Governor General Francisco de Sande wrote in his "Carta-relación de las Islas Filipinas" of the head-hunters in the interior: "los llaman tinguianes como serranos que tingue es sierra." It should not be difficult to verify and amplify the statements of my informant on the spot.

Another of my Isneg friends, questioned by me on the names they give to all their neighbors, informed me that for the inhabitants of certain rancherias towards the east, of which he mentioned Karakitan, Kalapog, and others, located south of Ripañg̃ between the Isneg and the Itawit of southern Cagayán, they had the popular name Kalà-ūwan, a term referring to some peculiarity of dress. The glottal check following the second *a* in this word points to the elision of a consonant, probably *g*, so that a fuller form of this name would be Kalagūwan. I suspect this to be the origin of the "tribal name" Calauas or Calaguas introduced by the Spaniards but relegated by Worcester to a synonymy with Kaliñg̃a. Buzeta and Bravo as well as Blumentritt spell Calaüas, that is, putting a stress on the *u*.

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[14] Philip. Journ. Sci. 19 (1921) 175–206.

ILLUSTRATION

TEXT FIGURE

FIG. 1. Map of the northernmost part of Luzon, showing the location of Apayao; mainly based on Coast and Geodetic Survey map of Northern Luzon (1922).

SOME NEW PHILIPPINE CHALCID FLIES

By A. A. GIRAULT

Of the Department of Agriculture, Brisbane, Queensland

The types of the following species are in the Queensland Museum, Brisbane, and the whole of the material was collected by Prof. C. F. Baker. The species resemble Australian forms.

CLEONYMINÆ

THAUMASURELLOIDES SILVAE Girault.

In the original description, line 8, the last word, "large," refers to the size of the whole insect and not to that of the femora.

EUPELMINÆ

CALOSOTA SPLENDIDA Girault.

A cotype female, No. 24238, Samar. The ovipositor was slightly extruded beyond stylus, apex red. Also another female, No. 24237, Sibuyan.

EUPELMUS COOKI (Girault).

Originally described from Singapore, a female was recognized in the material, No. 24243, Mount Maquiling, Luzon.

The narrow hyaline stripe of the fore wing was not quite complete caudad. Lateral ocellus against eye, latter hairy.

EUCYRTINÆ

ANAGYRODES PUNCTATICEPS sp. nov.

This genus heretofore has been known from Australia only.

Dark aëneous, wings clear, scape, venation, and legs reddish brown except coxæ, proximal half of femora, and tibia 3 entirely except more or less below near knee.

Head umbilicately punctate, punctures less dense and smaller below antennæ, latter a bit below middle of face but above eye ends, the head thin, rounded-triangular, frons wide. Ocelli well separated, lateral somewhat closer to median than to eye.

Prothorax transverse. Scutum, scutellum, and the large axillæ with a velvety sculpture and densely pilose from faint punctures. Hind femur compressed, setose, the tibia a bit wider (distinctly dilated) and more densely setose. Stigmal curved, distinctly exceeding postmarginal. Hairless line closed about three-fourths way down, ciliation from it to base somewhat looser, almost filling the wide costal cell.

Joint 2 of labial palpus wider than long, much shorter than 1 or 3; 2 of maxillary palpus much exceeding 3 which is subequal to 1; 4 longest; palpi dark. Scrobes short.

Funicles half longer than wide, 6 quadrate, equal to pedicel in length. Club distinctly 3-jointed.

Two females, Basilan, No. 24241.

A species typical of the genus except that the jaws are more acute than usual and the teeth very unequal. Thus 1 is thornlike, 2 though acute is short and more than halfway down the side of 1, while 3 is a mere notch farther down and below the base of 2 (3 is about halfway between base and apex of the inner margin of the jaw).

MEGASTIGMINÆ

BOOTANOMYIIA GEMMA sp. nov.

Differs from most of the Australian species in having the ovipositor equal to the body.

Brilliant green, wings clear; legs except coxa 3, head except center of occiput, upper half of face and all of vertex; tegulæ, scape beneath and at base more or less, pedicel beneath; median ventral line narrowly and lateral median line widely of abdomen (the lateral line crossing dorsum just before apex), golden.

Aëneous parts of head (except occiput) and dorsal thorax, striate densely (usually crosswise), on scutellum the striation more or less anastomosed, oblique distad of the cross suture; on propodeum, the striæ are coarser and longitudinal from base for a short distance, their length limited by a ruga (or a median pair) which leaves base at meson and after a short distance curves laterad; rest of propodeum with irregular rugæ, these not dense. Cephalic margin of scutum glabrous. Scattered obscure punctures elsewhere. Median, curved carinæ of propodeum separated at base.

Ring joint much wider than long; funicle 1 over thrice longer than wide, twice the pedicel; 2 over twice longer than wide, 7 nearly twice longer than wide. Jaw 3 widely truncate.

Dorsal scape with longish, stiff setæ. Lateral ocellus closer to median than to eye.

Scutum with scattered, loose pilosity, still sparser on scutellum where the marginal setæ number at least 6 for each side and are elongate.

A female, Baguio, Benguet, Luzon, No. 21242.

EUCHARITINÆ

PARAPSILOGASTER MONTANUS sp. nov.

Aëneous; wings obscurely stained from stigmal vein; veins, legs except coxæ, red-yellow, also tegula and scape, the abdomen with suffused brown.

Head and thorax finely striate in the usual manner, the widely joined axillæ obliquely, the scutellum longitudinally, its apex widely emarginate. Distal end of scutum and mesocaudal angle of parapside, smoother. A median impression near apex of scutellum. Propodeum finely rugulose but on each side of median line with a glabrous central area, the spiracular sulcus obscure. Petiole twice longer than wide, smooth. Lower mesopleurum densely foveate, a central glabrous area below the tegula. Pubescence of dorsal thorax sparse. Ciliation of fore wing longish, dense.

Funicle 1 a bit exceeding scape, nearly four times longer than wide, longest, 9.5 longer than wide, shorter than the solid club, exceeding pedicel; club equal to funicle 3, ovate. Mouthpiece 7-digitate, digits long, mesal ones longer, each at apex with a stout, elongate spine.

A female, Mount Maquiling, Luzon, No. 24246.

PARAPSILOGASTER STRIATUS sp. nov.

As the preceding but the petiole with strong longitudinal carinæ, wings hyaline, propodeum entirely rugose-punctate, abdomen entirely green and smaller, triangular.

Also the antennæ are entirely reddish, the mouth plate 9-digitate and the upper face is smoother. The lateral part of scutellum also is rather coarsely foveate and there is no median impression near apex.

A female, Los Baños, Laguna, Luzon, No. 24244.

CHALCURA GLABRA sp. nov.

Purple, wing with a rectangular cloud from distal end of marginal and the stigmal vein, one-third complete, thence faintly suffused across. Legs save coxæ, scape, pedicel, pale straw yellow; abdomen at apex widely (or distad of the long segment 2) reddish yellow.

Glabrous but with foveate parapsidal furrows; a few coarse cross striæ on prothorax and cephalic scutum; minute pin punctures on head, axillæ; coarse foveæ at base of scutellum and the latter with a median carina and carinate margins (except base). Dorsal thorax with scattered, longish hairs, also the vertex. Propodeum with foveate base and spiracular and dorsolateral sulci, the petiole six times longer than wide, finely, obscurely long-lined; segment 2 over three-fourths surface, more or less minutely pitted. Lateral ocellus much closer to median than to eye. Discal cilia of the fore wing dense, to opposite base marginal vein, longish and hairlike, costal cell well ciliated.

Funicle 1 elongate, seven times longer than wide, longest, slightly toothed at apex, 2 to 7 on same side at apex with a thick thornlike prolongation, narrowest on 2; 7 over twice longer than wide. Club constricted (but not articulated) at middle, subequal to funicle 2, pedicel very short.

Jaws usual, 2- and 3-dentate. Palmate mouth plate 9-digitate, the digits elongate-spindle-shaped, armed at apex with a strong, elongate spine.

A female, Mount Maquiling, Luzon, No. 24247.

Runs to the genus in Ashmead's table but, as the club is solid, the antennæ are 10-jointed only.

KAPALA FASCIATIPENNIS sp. nov.

Blue-green, the fore wing with a brown cross stripe (not quite reaching caudal margin), more or less wavy, from stigmal vein. Tegulæ, legs save coxæ, antennæ, red-brown, scape paler, femora more or less aëneous.

Head striate, glabrous below antennæ. Scutellum with a median groove and coarsely long striate as are the axillæ; scutum, parapsides pilose, finely cross striate. Prong of scutellum normal, arms exceeding the basal part by two times, the whole process about as long as the pilose scutellum. Propodeum rugose-punctate, with a shallow, wide, rugulose (or weakly tricarinate) median path and laterad of this a large, central subglabrous area; spiracular and dorsolateral sulci, narrow, obscure, punctate. Cephalic mesopleurum glabrous.

Petiole twice longer than wide, more or less lineolated with margins carinate; segment 2 glabrous, the whole surface. Discal ciliation long, extending widely cephalad halfway to base from base marginal, the wide costal cell ciliate.

Antennæ serrate, 11-jointed. Scape over twice length funicle 1 which widens distad and is more or less twice longer than wide at apex; funicles 2 to 8 produced from apex of the same side, 2 for a short distance only, 3 to 6 for a distance greater than their width, the produced part triangular and tipped at apex; club equal to funicle 1, exceeding other funicles, oval. Funicles and club densely setose.

Mouth plate 8-digitate, the digits long, the external one of each side more divergent and originating farther down, longer, all with stout apical spines. Jaws 2- and 3-dentate, as usual.

A female, Cuernos Mountains, Negros, type, No. 24249; cotype female, Baguio, Benguet, Luzon, No. 24245.

KAPALA FOVEATELLA sp. nov.

Aëneous, wing with a transverse substigmal spot and faintly dusky from thence to apex; tegulæ, legs except coxæ, scape, pedicel (rest of antennæ but darker), rich reddish.

Head above antennæ striate, below smooth but face with scattered pin punctures. Thorax rugose-punctate, with spiracular and dorsolateral sulci on propodeum and a wider, foveate median sulcus on scutellum.

Petiole nearly five times longer than wide, scabrous, lateral margins carinate; segment 2 the whole surface glabrous, but laterad and ventrolaterad with numerous pin punctures; wide space between axillæ striate. Prong as in *Kapala fasciatipennis* but basal part a bit longer than wide; discal ciliation as in the same species. Palpi 3-jointed, 1 of maxillary elongate.

Funicle 1 half longer than wide, toothed at apex on one side (the same side that bears the rami), not half the scape, with the following joints, densely setose; 2 to 5 quadrate, following lengthening, 7 equal 1 but narrower, 9 twice 1; from apex on same side, joints 2 to 9 (funicle), a very elongate ramus is borne, that of 2 sometimes considerably shorter. Club solid, narrow, elongate twice scape, shorter than the rami of 5 to 7 which are longest. Mouth plate as in *fasciatipennis*. Pedicel very short.

Two males, Mount Maquiling, Luzon, Nos. 24,250 (type) and 24,248 (cotype).

Typical for the genus, but the antennæ are 12-jointed.

In the Eucharitinæ, the palpi might prove of much value in classification, but in most specimens they seem to be missing; nor have they been much noted in descriptions.

NEW OR LITTLE-KNOWN TIPULIDÆ FROM EASTERN ASIA (DIPTERA), III[1]

By CHARLES P. ALEXANDER
Of Amherst, Massachusetts

TWO PLATES

The crane flies discussed in the present report were taken chiefly at high altitudes in the mountains of Formosa by Prof. Syuti Issiki. Fewer were collected in Fukushimaken and Miyagiken, northeastern Honshiu, Japan, by Professor Issiki. This important series has added materially to our knowledge of the tipulid fauna of these two regions. I am including the single new species of *Paracladura* (Trichoceridæ) that was contained in this shipment. I am greatly indebted to Professor Issiki for the privilege of retaining the types of the novelties described at this time.

The venational innovations mentioned in the preceding part under this title[2] have now been discussed in detail in two recent papers.[3] Several leading students of venation in Australia and New Zealand, as Messrs. Mackerras, Nicholson, Tillyard, and Tonnoir, and the late Doctor Ferguson, have indicated (in litt.) their approval of the main principles of this modification of the radial field but have held that in certain groups (subfamilies Tipulinæ and Cylindrotominæ; tribes Limoniini and Lichriini of the Limoniinæ) these principles have been insufficiently applied. I now consider that this contention is correct, and the venation in the groups listed may be brought into conformity with the three tribes in the Limoniinæ (Pedicini, Hexatomini and Eriopterini) where it has been satisfactorily applied by making the following changes in the names of certain elements of the veins: Free tip of R_1 becomes free tip of Sc_2; r becomes R_1; R_2 becomes R_{1+2}.

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[1] Contribution from the Department of Entomology, Massachusetts Agricultural College.

[2] Philip. Journ. Sci. 35 (1928) 455–489.

[3] Proc. Linn. Soc. N. S. W. 52 (1927) 42–72, fig. 92; Rec. Ind. Mus. 29 (1927) 169–172, pl. 13.

TRICHOCERIDÆ

PARACLADURA CUNEATA sp. nov.

General coloration pale brown, the mesonotal præscutum with a dark brown median stripe; rostrum and scapal segments of antennæ yellow; wings nearly hyaline, cuneiformly narrowed at base; male hypopygium with the dististyle simple; gonapophyses appearing as pale flattened blades, each prolonged into a needlelike point.

Male.—Length, about 3.2 millimeters; wing, 4.

Female.—Length, about 3.8 millimeters; wing, 5.

Rostrum yellow; palpi dark brown. Antennæ setaceous, as in the family; scapal segments light yellow; flagellum dark brown. Head light brown.

Pronotum dark brown medially, paler laterally. Mesonotum pale brown, the præscutum with a dark brown median stripe; scutellum dark brown, the postnotum more testaceous brown. Pleura yellowish testaceous, with a diffuse brown dorsal stripe. Halteres relatively elongate, yellow, the knobs infuscated. Legs with the coxæ and trochanters yellowish testaceous; remainder of legs pale brownish yellow, the terminal tarsal segments darker; basistarsus more than three times as long as thick. Wings relatively narrow, the basal third cuneiformly narrowed, nearly hyaline; veins and macrotrichiæ brown. Venation (Plate 1, fig. 1): Vein $R_1 + Sc_2$ near its outer end and the basal portion of R_{1+2} arcuated toward costa; cell M_1 about one-half longer than its petiole; cell 1st M_2 very narrow; m-cu on M_4 shortly beyond its origin.

Abdominal tergites dark brown, the sternites and outer tergites somewhat brighter brown; subterminal segments dark brown; hypopygium brownish yellow. Male hypopygium (Plate 2, fig. 1) with the basistyles, *b*, short and stout; dististyle, *a*, simple, appearing as an elongate-cylindrical lobe, the mesal face except on the basal fourth with delicate retrorse setæ. Ædeagus double. Gonapophyses appearing as pale flattened blades, each prolonged into a needlelike point.

Habitat.—Formosa.

Holotype, male, Noko, altitude 9,000 feet, June 26, 1927 (*S. Issiki*). Allotopotype, female.

In the collections from Noko, altitude 8,000 feet on June 26, 1927, Professor Issiki included a second species of *Paracladura*, unfortunately represented only by the female sex. I suspect that this will prove to be *P. nipponensis* Alexander, described from Kiushiu. There is no question that the higher mountains of Formosa support at least three species of this interesting genus.

TIPULIDÆ

TIPULINÆ

NESOPEZA TRICHOPYGA sp. nov.

General coloration of thorax dull brownish yellow; antennæ relatively long, flagellar segments elongate, the verticils relatively short; tarsi whitish; wings with a strong brownish tinge, the oval stigma darker brown; male hypopygium with the fused basistyle and sternite produced caudad into a conspicuous lobe, the caudal margin of which bears long yellow setæ.

Male.—Length, about 9 millimeters; wing, 10.5; antenna, about 3.6.

Frontal prolongation of the head short, brownish testaceous, dark brown at tip; palpi brown, elongate. Antennæ (Plate 2, fig. 3) relatively long, the flagellar segments elongate, becoming shorter and slenderer outwardly; verticils very sparse and scattered, more elongate and conspicuous outwardly; scapal segments yellowish brown, the flagellum dark brown. Head above rich fulvous brown, the vertex behind and the occiput more testaceous brown.

Pronotum yellowish brown. Mesonotum nearly uniform dull brownish yellow, the præscutum unmarked. Pleura obscure yellow, the anterior pleurites a little darker. Halteres elongate, pale brown, the base of the stem narrowly yellow, the knobs infuscated. Legs with the coxæ obscure yellow, the fore coxæ a little darker; trochanters obscure yellow; femora pale brown, the bases brighter, the tips a little darkened; tibiæ pale brown, the tips paling to dirty white; tarsi chiefly dirty white, the terminal segment darker. Wings with a strong brownish tinge, the oval stigma darker brown; veins beyond the cord vaguely and narrowly seamed with brown. Venation (Plate 1, fig. 2): Free tip of Sc_2 pale; medial cells relatively deep.

Abdominal tergites dark brown, the bases of the intermediate segments light brown; basal sternites chiefly light yellow, the outer segments brownish black. Male hypopygium viewed from the side (Plate 2, fig. 2) with the heavily blackened ninth tergite, *t*, medially provided with conspicuous erect yellow setæ, the caudal lateral angles produced into an erect black spine on either side. Outer dististyle, *d*, fleshy, dusky at tip, with conspicuous black setæ. Inner dististyle a highly compressed blade.

The fused ventral portion of the basistyle and ninth sternite, *s*, produced caudad into a conspicuous lobe, the broad, gently convex margin of which bears very long conspicuous yellow setæ.

Habitat.—Formosa.

Holotype, male, Noko, altitude 9,000 feet, June 26, 1927 (*S. Issiki*).

Nesopeza trichopyga is well distinguished by the rather remarkable hypopygium of the male. It may be distinguished from *N. taiwania* Alexander by the more elongate antennæ (Plate 2, figs. 3, 4) and the deeper medial cells of the wing (Plate 1, figs. 2, 3).

TIPULA (ACUTIPULA) LACKSCHEWITZIANA sp. nov.

Allied to *T. filicornis* Brunetti; antennæ (male) elongate, with conspicuous erect setæ and pubescence; male hypopygium very large, the ninth tergite subtruncate across the caudal margin; outer dististyle a slender complicated black structure.

Male.—Length, about 14.5 millimeters; wing, 16.5 antenna, about 15.

Frontal prolongation of the head obscure yellow, the dorsal half brighter; nasus relatively slender, with long black setæ, those at the tip yellow. Antennæ (male) very elongate, as shown by the measurements; basal segment of scape very narrow at base; scapal segments obscure yellow, the flagellar segments brown; basal enlargement of segments small and slightly darker in color; flagellar segments elongate-cylindrical, with long scattered black verticils and a shorter delicate erect white pubescence, the longest verticils fully seven or eight times the diameter of the segment at the point of attachment; terminal segment short. Head buffy brown, brighter in front and on the narrow posterior orbits.

Mesonotum pale buffy brown with four scarcely evident, slightly more-grayish stripes that are vaguely margined with a narrow line of darker brown; scutal lobes a little grayish, the median area buffy; scutellum brown, more yellowish medially; postnotum yellowish gray with yellow setæ. Pleura yellow. Halteres relatively slender, pale brown, the base of the knobs somewhat darker. Legs with the coxæ and trochanters light yellow; femora brown, the bases narrowly yellow, the tips narrowly blackened; tibiæ yellowish brown, darkened outwardly; tarsi black, terminal segments broken. Wings with a grayish suffusion; stigma brown; cells C and Sc slightly less infumed than the stigma, especially the former; prearcular region more yellowish; veins dark brown, obliterative areas extensive. Venation: Cell R_2 small, as in the subgenus, the inner end pointed; cell 1st M_2 relatively small, irregularly pentagonal; m a trifle longer than the petiole of cell M_1; cell 2d A relatively narrow.

Abdominal tergites obscure yellow, the lateral margins narrowly dark brown; sternites clearer yellow; a conspicuous black subterminal ring that includes segments 6 to 8; segment 9 brownish yellow. Male hypopygium (Plate 2, fig. 5) large. Tergal region, *t*, pale, appearing as a convex subrectangular plate, the caudal margin subtruncate, provided with long conspicuous yellow setæ. Outer dististyle, *d*, black, complicated in structure, viewed laterally appearing more or less bomerang-shaped, the long apex obtuse at tip; outer surface of apical arm dull with an appressed pubescence, the inner of mesal surface shiny; viewed caudally (Plate 2, fig. 5*a*), the mesal margin of the style is seen to be microscopically serrulate, near the base bearing a slender arm that is microscopically spiculose. Caudomesal margin of sternal region, *s*, bearing dense brushes of short reddish brown setæ, with an additional median brush; region of sternite ventrad of this densely filled with pale membrane.

Habitat.—Formosa.

Holotype, male, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*).

This interesting *Tipula* is named in honor of my friend, Dr. P. Lackschewitz, of Latvia, eminent student of the crane flies of the Baltic region. It is the first representative of the subgenus *Acutipula* to be described from Formosa. The species is allied to *T. filicornis* Brunetti[4] and *T. mitocera* Alexander;[5] it differs, especially, in the structure of the male hypopygium.

TIPULA NOKONIS sp. nov.

General coloration greenish gray, the præscutum with four dark olive-brown stripes that are narrowly margined with dark brown; antennal scape bright yellow, the flagellum black; tips of the femora black, preceded by a vague yellowish subterminal ring; wings creamy, variegated with brown and gray clouds; male hypopygium with the ninth sternite produced ventrad into a conspicuous tubercle.

Male.—Length, about 18 millimeters; wing, 19.5.

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[4] Rec. Ind. Mus. **15** (1918) 267–268.

[5] Rec. Ind. Mus. **29** (1927) 181–182, fig. 3.

Frontal prolongation of head relatively long, nasus distinct, dark grayish brown, with a more-chestnut lateral stripe; palpi dark brown, the base of the elongate terminal segment paler. Antennæ of moderate length, if bent backward extending to shortly beyond the base of the abdomen; scape bright yellow, flagellum black; basal enlargement of the flagellar segments relatively small, verticils comparatively long. Head buffy, more reddish in front and laterally behind, the vertex with a conspicuous dark brown median area.

Mesonotal præscutum with a greenish gray ground color, with four dark olive-brown stripes that are narrowly margined with brownish black; scutum greenish gray medially, each lobe with two dark areas; scutellum dark, sparsely pruinose, with a median brown line; postnotal mediotergite pale greenish gray with a capillary brown median line. Pleura variegated brown and olive-gray, in ill-defined areas, the pleurotergite with a velvety area before the halteres. Halteres elongate, brownish yellow, the base of the knobs conspicuously blackened. Legs with the coxæ greenish gray; trochanters brownish yellow; femora yellowish brown, the tips conspicuously blackened, preceded by a diffuse, somewhat brighter yellow ring; tibiæ brown, passing into dark brown; tarsi brownish black. Wings with a creamy ground color, the prearcular region and cells C and Sc yellow; a conspicuous brown and grayish brown pattern, distributed over the entire wing, the darker spots being at arculus, origin of Rs, and stigma; wing tip rather uniformly darkened; of the paler clouds in the medial cell, the outer one is much the larger, the narrower inner cloud being confluent across vein M with extensive similar clouds in cell R; veins dark brown, brighter in the flavous areas. Venation: Rs long; R_{1+2} entirely preserved, without macrotrichiæ except one or two at extreme base; cell 1st M_2 relatively short and high, irregularly pentagonal; petiole of cell M_1 shorter than m.

Abdominal tergites reddish with three brownish black stripes, the sublateral stripes widening out on the outer segments, the apex of the abdomen, including segments 6 to 8 and the hypopygium black; lateral margins of the segments narrowly buffy; basal sternites more reddish brown, the outer segments dark brown, pruinose; caudal and lateral margins of the segments very narrowly margined with buffy. Male hypopygium (Plate 2, fig. 6) relatively small, the tergite, *t*, fused with the sternite basally. Ninth tergite (Plate 2, fig. 7) relatively short and wide, the caudal margin with a broad U-shaped notch, the lateral lobes thus formed being even wider, subtruncate to obtusely rounded at tips. Ninth sternite, *s*, produced ventrad into a conspicuous tubercle. Basistyle, *b*, complete. Outer dististyle, *d*, flattened, narrowed at base, more or less spade-shaped, provided with delicate yellow setæ and scattered longer black setæ. Inner dististyle a chitinized, highly compressed blade, the caudal margin with conspicuous yellow setæ. Eighth sternite with the ventral surface provided with very long yellow setæ.

Habitat.—Formosa.

Holotype, male, Noko, altitude 9,800 feet, June 27, 1927 (*S. Issiki*).

Tipula nokonis is generally similar to *T. subapterogyne* Alexander, likewise from Noko, *T. terebrata* Edwards, and several other species in eastern Asia. It differs in the details of coloration of the antennæ, wings, and thorax, but especially in the structure of the male hypopygium. The peculiar tubercle on the ninth sternite is approached in a lesser degree by *T. verecunda* Alexander, of northern Japan.

TIPULA SPARSISSIMA sp. nov.

Belongs to the *T. annulicornis* group; antennæ (male) relatively elongate, bicolorous; mesonotal præscutum golden yellow with four pale olive-brown stripes; wings creamy, vaguely tinted with brown, especially in cell R_3; basal and costal regions light yellow; cord and vein Cu seamed with brown; a small group of macrotrichiæ in the distal end of cell R_5; m-cu close to the fork of M; cell 1st M_2 small; male hypopygium with the median lobe of the tergite short, compressed.

Male.—Length, about 8.5 millimeters; wing, 9.6.

Female.—Length, about 9.5 millimeters; wing, 10.4.

Frontal prolongation of the head relatively short, the nasus reduced to a small tubercle; prolongation obscure yellow, darker laterally; palpi dark brown. Antennæ (male) relatively long, if bent backward extending to beyong the base of the abdomen; scape yellow; flagellar segments bicolorous, the basal enlargement of each segment black, the apex obscure yellow; outer segments more uniformly infuscated. In the female the antennæ are short but similarly bicolorous. Head yellowish gray to olive gray.

Mesonotal præscutum golden yellow with four pale olive brown stripes, the intermediate pair narrowed behind, scarcely attaining the suture, the capillary line separating them only a little paler than the stripes themselves; anterior ends of the intermediate stripes more or less golden pollinose; scutum greenish yellow, the lobe marked with brown; scutellum and postnotum brownish yellow. Pleura yellow, vaguely variegated with dusky on the propleura, anterior anepisternum and again near the root of the halteres. Halteres slender, testaceous, the apices of the knobs light yellow. Legs with the coxæ and trochanters yellow; femora yellow, the tips brownish black; tibiæ brown, the tips narrowly darkened; tarsi dark brown. Wings with a faint creamy ground color, vaguely tinged with brown, more especially in cell R_3; prearcular and costal regions light yellow; stigma oval, dark brown, conspicuous brown seams between the branches of Cu and along the cord; obliterative areas very extensive, appearing as creamy before and beyond the stigma, and across cell 1st M_2, covering almost all of the basal sections of M_{1+2} and M_3; veins dark brown, yellowish in the flavous areas. A small group of from about five to fifteen macrotrichiæ in the outer end of cell R_5. Venation (Plate 1, fig. 4): Rs relatively short; R_{1+2} entire; R_2 distinct, more than one-half R_1 alone; cell 1st M_2 very small; m-cu long, close to the fork of M; m in cases greatly reduced; m-cu long.

Abdominal tergites obscure brownish yellow, the caudal and lateral margins of the segments darkened; sternites obscure yellow; subterminal segments blackened; hypopygium dark brown. Male hypopygium (Plate 2, fig. 8) with the caudal margin of the ninth tergite produced caudal into a short, highly compressed, median blade. Tergite, *t*, and sternite, *s*, fused basally, the basistyle more or less rectangular in outline, cut off from the remainder of the hypopygium by incomplete sutures above and below. Outer dististyle relatively slender, pale, with scattered setæ. Inner dististyle, *d*, a greatly compressed blade that extends to a slender black point at the anterior margin.

Habitat.—Formosa.

Holotype, male, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*). Allotopotype, female, pinned with the male. Paratopotypes, 2 males, 8,000 to 8,500 feet.

Although generally similar to *T. sparsiseta* Alexander, *T. acifera* Alexander, and other Japanese species of the *T. annulicornis* group, the present species is abundantly distinct in the venation and wing pattern. The present form is likewise generally similar to *T. microcellula* Alexander, also from Formosa, but actually belongs to an entirely different group of species.

LIMONIINÆ

PEDICIINI

TRICYPHONA OROPHILA sp. nov.

General coloration dark gray, the præscutum with three black stripes; antennæ 16-segmented, black throughout; halteres yellow, the knobs weakly infuscated; legs black, the femoral bases yellow; wings yellowish brown, the base clearer yellow; r-m connecting with R_{4+5} just beyond origin; m at fork of M_{1+2} male hypopygium with the interbases appearing as very large, flattened, curved blades.

Male.—Length, about 8 millimeters; wing, 10.

Rostrum and palpi black. Antennæ 16-segmented, black throughout, the basal segment sparsely pruinose; flagellar segments short-oval, the outer segments more elongate oval and less crowded. Head dark gray; vertical tubercle conspicuous, simple.

Pronotum dark gray. Mesonotum dark gray, the præscutum with three black stripes, the median stripe weakly bifid behind; extreme margin of humeral region more chitinized, obscure horn yellow; scutal lobes black, the median area and remainder of the notum gray pruinose. Pleura dark gray. Halteres relatively elongate, pale yellow, the extreme base of the stem more orange, the knobs weakly infuscated. Legs with the coxæ dark gray, the lower faces more yellowish, especially of the fore coxæ; trochanters brownish yellow; femora black, the bases broadly yellow, narrowest on the fore femora where it includes only about the basal sixth, broader on the hind legs where nearly the basal half is brightened; fore and middle tibiæ black, hind tibiæ paler, the tips darkened; tarsi black. Wings with a strong yellowish brown tinge, the base more strongly yellow; narrow and vague dusky seams along the cord; veins dark brown, the subcostal and prearcular veins more yellowish. Venation (Plate 1, fig. 5): Sc long, Sc_1 extending to just beyond the base of cell R_4; Sc_2 some distance before the origin of Rs; R_2 about twice R_{1+2}; r-m connecting with R_{4+5} just beyond the end of Rs; cell R_4 deep; m present, opposite the fork of M_{1+2} m-cu connecting with M_4 just beyond its base.

Abdomen brownish black, including the hypopygium. Male hypopygium (Plate 2, fig. 9) with the ninth tergite, *t*, very large, the caudal margin subtruncate or very feebly emarginate, provided with low lobes. Basistyle, *b*, moderately slender, deeply bifid at apex, the outer lobe a little more elongate, spinose and setose at tip, the inner lobe more flattened, with very elongate setæ. Dististyle, *d*, single, in the notch of the basistyle, provided with short, black, peglike spines. Interbase, *i* (only one shown in figure), very powerful, appearing as flattened divergent blades, strongly curved, the inner margin with a few microscopic setulæ, the apex strongly recurved, obtuse, set with low spinous teeth.

Habitat.—Formosa.

Holotype, male, Noko, altitude 9,000 feet, June 26, 1927 (*S. Issiki*).

Tricyphona orophila is very different from other described members of the genus; in general appearance it is most similar to *T. optabilis* Alexander, of Japan, but is still very distinct.

RHAPHIDOLABIS (RHAPHIDOLABIS) ATRIPES sp. nov.

General coloration light gray, the præscutum with four narrow dark brown stripes; antennæ 14-segmented, black throughout; legs black, the femoral bases restrictedly paler; wings subhyaline, stigma brown, prearcular region light yellow; cell R_3 petiolate; cell M_2 open.

Male.—Length, about 5.5 millimeters; wing, 7.

Rostrum gray; palpi black. Antennæ 14-segmented, the terminal segment longer than the penultimate; antennæ black, the basal segment a little pruinose; second scapal segment long, nearly equal in length to the first flagellar; intermediate flagellar segments oval. Head light gray, the center of the vertex a little infuscated.

Pronotum light gray. Mesonotum light gray, the præscutum with four narrow dark brown stripes, the intermediate pair not reaching the suture; each scutal lobe with two dark markings. Pleura clear light gray, including the dorsopleural membrane. Halteres pale, the knobs infuscated. Legs with the coxæ gray; trochanters light brown; remainder of legs black, only the extreme bases of the femora somewhat paler. Wings subhyaline, the ill-delimited stigma brown; prearcular region light yellow; veins dark brown. Venation (Plate 1, fig. 6): $Sc_2 + R$ approximately two-thirds $Sc_2 + R_1$; R_2 gently oblique in position, much longer than R_{1+2}; Rs weakly angulated near midlength; R_{2+3+4} longer than R_2; cell M_1 short; cell M_2 open; m-cu at about one-third its length beyond the fork of M.

Abdomen dark brown, sparsely pruinose. Male hypopygium (Plate 2, fig. 10) with the lateral lobes of the ninth tergite, *t*, large, conspicuously setiferous, the median area smooth, subchitinized. Lateral lobe of the basistyle, *b*, with abundant setæ and short spines. Dististyle, *d*, parallel-sided, a little longer than the lobe of the basistyle. Interbase broad at base, gradually narrowed to the curved acute tip.

Habitat.—Formosa.

Holotype, male, Higashinoko, altitude 7,500 feet, June 27, 1927 (*S. Issiki*).

Rhaphidolabis atripes is allied to *R. flavibasis* Alexander, of Japan, differing in the smaller size, shorter antennæ, the presence of four instead of three præscutal stripes, and slight differences in the male hypopygium. This may possibly be the species recorded as *R. brunettii* Edwards[6] based on a female specimen from Arisan. Brunetti's description[7] differs in many regards from the present form in the coloration and structure of the antennæ. It is possible that the high mountains of Formosa support a rather considerable number of species of pediciine crane flies.

LIMONIINI

ORIMARGA PRUINOSA sp. nov.

General coloration of head and thorax light gray; wings grayish subhyaline, the veins pale; R_{2+3} elongate, nearly as long as R_3 alone; abdomen elongate, the tergites dark brown.

Female.—Length, about 7 millimeters; wing, 5.8.

Rostrum brown; palpi dark brown. Antennæ with the scapal segments brown; flagellum black; antennæ relatively short, if bent backward ending some distance before the wing root; flagellar segments oval. Head light gray, brighter anteriorly.

Mesonotum light gray, the præscutum with four slightly darker gray stripes; anterior lateral pretergites restrictedly orange-yellow. Pleura gray. Halteres pale orange-yellow, the knobs a trifle darker. Legs with the coxæ dark brown, sparsely pruinose; trochanters yellowish brown; remainder of legs brownish yellow, the terminal tarsal segments darker. Wings grayish subhyaline, the veins pale. Macrotrichiæ of veins relatively abundant; none on Rs, R_2, or the basal two-thirds of R_{2+3}; a series of trichiæ on the other longitudinal veins beyond the cord; no trichiæ on Cu or the anal veins. Venation (Plate 1, fig. 7): Sc long, Sc_1 ending nearly opposite the fork of Rs, Sc_2 a short distance from its tip; free tip of Sc_2 very pale and indistinct but present; R_{2+3} elongate, nearly as long as R_3; R_2 a little shorter than R_{1+2}; petiole of cell M_3 shorter than M_4; m-cu shortly before midlength of Rs.

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[6] Ann. & Mag. Nat. Hist. VIII 18 (1916) 254; IX 8 (1921) 101.

[7] Fauna British India, Dipt. Nematocera (1912) 492.

Abdomen elongate; tergites dark brown; sternites a little more yellowish brown; genital segment obscure orange. Ovipositor with the tergal valves slender, gently upcurved to the acute tips.

Habitat.—Japan (Honshiu).

Holotype, female, Mount Bantaizan, Fukushima-ken, August 4, 1927 (*S. Issiki*).

Orimarga pruinosa is most closely allied to *O. formosicola* Alexander, of Fomosa, which differs in the narrower wings with darker veins and slightly different venation. The genus *Orimarga* had not been recorded hitherto from the main islands of Japan.

DICRANOPTYCHA CAESIA sp. nov.

Antennæ brown throughout; thorax clear light gray, the præscutum with light brown stripes; tips of the femora weakly infuscated; wings strongly tinged with yellow; m greatly reduced in length; abdomen obscure yellow.

Female.—Length, about 10 millimeters; wing, 10.

Rostrum dark, sparsely pruinose; palpi dark brown. Antennæ brown throughout, the first scapal segment still darker, pruinose; flagellar segments oval, with relatively short verticils. Head light gray.

Pronotum and mesonotum clear light gray, the præscutum with two narrow submedian pale brown stripes that are obsolete anterior to the small tuberculate pits; lateral stripes less distinct; pseudosutural foveæ black. Pleura clear light gray. Halteres pale yellow. Legs with the coxæ yellow, the extreme bases of the fore and middle coxæ a little darkened and sparsely pruinose; femora yellow, the tips narrowly and weakly infuscated; tibiæ and basitarsi yellow, the tips narrowly brown; remainder of tarsi dark brown. Wings strongly tinged with yellow, iridescent; veins brown, the costal, subcostal, and radial veins yellow. Costal fringe (female) short. Venation: Rs a little longer than cell 1st M_2; m greatly reduced, the basal section of M_3 correspondingly lengthened; m-cu about one-half its length beyond the fork of M.

Abdomen obscure yellow, the segments more infuscated laterally. Ovipositor with the tergal valves conspicuously compressed, the tips obtusely rounded.

Habitat.—Japan (Honshiu).

Holotype, female, Tatusawa, near Inawasiro, Fukushimaken, altitude 2,000 feet, August 5, 1927 (*S. Issiki*).

Dicranoptycha caesia may be confused only with *D. yamata* Alexander, which is distinguished by the much larger size and different coloration, such as the pale antennal scape and uniformly darkened abdomen.

HEXATOMINI

EPIPHRAGMA NYMPHICA sp. nov.

General coloration dark brown; antennæ with the scape black, the basal flagellar segment yellow; outer flagellar segments passing into dark brown; halteres with the apices of the knobs light yellow; legs yellow, the femora with a broad black subterminal ring; wings creamy, the costal region light yellow, the disk with a broken, more or less ocelliform, dark brown pattern; radial cells extensively free from markings.

Male.—Length, about 8 to 9 millimeters; wing, 9.5 to 11.

Rostrum brownish black; palpi black. Antennæ with the scapal segments black; basal segment of flagellum enlarged, bright yellow; second segment slightly more obscure; succeeding flagellar segments testaceous, the outer segments passing into dark brown; flagellar segments cylindrical, with relatively long verticils. Head dark brown, the posterior orbits a little brighter.

Pronotum and mesonotum dark brown, the præscutum with a narrow velvety black median stripe that is narrowed to a point behind and becomes obsolete some distance before the suture; anterior half of the sclerite a little dusted with golden-yellow pollen; lateral margins of the sclerite blackened. Pleura, including the dorsopleural region, black; surface vaguely variegated with areas of yellowish pollen. Halteres dark brown, the base of the stem restrictedly pale, the apices of the knobs light yellow. Legs with the coxæ brownish yellow; trochanters obscure yellow; femora yellow with a relatively broad black ring before the tips, this ring nearly twice as extensive as the pale apex beyond; tibiæ and tarsi yellow, the terminal tarsal segment brown. Wings creamy, the costal region broadly light yellow; a handsome dark brown pattern, consisting of confluent broken circles in cells C to M, having as centers a point beyond the arculus and the origin of Rs, the latter ocellus connected with a large solid area in the cubital and anal cells, ending at vein 2d A, with a connecting area at near two-thirds the length of cell 2d A; the basal ocellus is connected with the prearcular region; base of cell 2d A darkened;

a third, very extensive, broken ocellus has the entire cord as a center; beyond the cord an irregular arcuated brown band extending from the end of cell R_5, across the outer end of cell 1st M_2 to the wing margin in cells Cu and 1st A; besides the above major areas there are scattered isolated marks at h, the supernumerary crossvein in cell C, tip of R_3, and tips of veins M_3 and M_4; the radial cells are thus conspicuously free from markings except basally and in cell R_5; veins yellow, especially bright in the outer costal region, dark brown in the infuscated areas. Venation: Supernumerary crossvein in cell C perpendicular; R_{2+3+4} longer than R_{2+3}; cell M_1 about as long as its petiole; cell 1st M_2 large, gently widened outwardly; m-cu near the inner end of cell 1st M_2, about its own length beyond the fork of M.

Abdominal tergites dark brown, the segments variegated caudally and medially with obscure yellowish gray; sternites dark, obscure yellow medially, the caudal margins narrowly gray; hypopygium yellowish brown.

Habitat.—Formosa.

Holotype, male, Kirakei, altitude 4,000 feet, June 28, 1927 (*S. Issiki*). Paratopotype, male.

Epiphragma nymphica is separated from the rather numerous species in southern and eastern Asia by the diagnostic features listed above. The species appears to be most similar to *E. vicina* Brunetti in the black femoral ring but differs in many important details of coloration.

PSEUDOLIMNOPHILA NOKONIS sp. nov.

General coloration of thorax dark brown, the præscutum dull ocherous, with a broad black median stripe; pleura with a narrow black longitudinal stripe; rostrum and palpi yellow; antennæ black; wings yellow, sparsely variegated with brown; cells beyond the cord unusually short for a member of this genus.

Female.—Length, about 7.5 millimeters; wing, 7.5.

Rostrum and palpi yellow. Antennæ black throughout; flagellar segments long-oval. Head brownish gray.

Pronotum ocherous brown, somewhat darker laterally. Mesonotal praescutum dull ocherous, with three brown stripes, the median stripe broad and conspicuous, especially behind, the lateral stripes scarcely evident; tuberculate pits lacking; pseudosutural foveæ reduced to small pale depressions close to the margin; remainder of mesonotum dark brown, sparsely pruinose. Pleura with a narrow black longitudinal stripe extending from the cervical sclerites, passing above the fore coxæ, traversing the anepisternum and middle portion of the pteropleurite to the pleurotergite, where it is more pruinose; ventral pleurites pale gray; dorsopleural region pale. Halteres relatively long, pale yellow, the knobs infuscated. Legs with the coxæ and trochanters yellow; remainder of legs yellow, the tips of the tibiæ weakly infuscated, the terminal tarsal segments passing into dark brown. Wings with a strong yellow suffusion; stigma long-oval, pale brown; very narrow and vague brown seams at origin of Rs, along the cord and the outer end of cell 1st M_2; veins dark brown, the basal veins more yellowish. Venation (Plate 1, fig. 8): Sc short, both Sc_1 and Sc_2 ending before the fork of Rs; Rs strongly arcuated at origin; R_{2+3+4} only gently arcuated; R_2 subequal to R_{1+2}; all cells beyond the cord unusually short; cell M_1 about three times its petiole; cell 1st M_2 large; m-cu about one-half its length from the outer end of the cell; anterior arculus lacking.

Abdominal tergites dark brown, the caudal margins of the individual segments obscure yellow; sternites clearer yellow. Ovipositor with the valves horn-colored, the sternal valves black at base; tergal valves very slender and only gently upcurved.

Habitat.—Formosa.

Holotype, female, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*).

Pseudolimnophila nokonis is somewhat similar to *P. kirishimensis* (Alexander), of southern Japan, differing from this and all other regional species by the short subcosta and the unusually short veins and cells beyond the cord, in combination with the petiolate cell M_1 and position of m-cu.

LIMNOPHILA (TRICHOLIMNOPHILA) EXCELSA sp. nov.

General coloration black, the thorax sparsely pruinose; antennæ black; halteres yellow; legs yellow, the tips of the femora broadly, of the tibiæ more narrowly, blackened; wings brownish yellow, sparsely variegated with brown; macrotrichiæ of cells restricted to outer ends of cells R_2 to M_3.

Female.—Length, about 7 millimeters; wing, 6.

Rostrum and palpi black. Antennæ black, the first scapal segment vaguely paler at base; flagellar segments with long verticils. Head black, heavily gray pruinose.

Pronotum black, gray pruinose. Mesonotum coal-black, the surface very sparsely pruinose to give a subnitidous appearance; postnotum more pruinose. Pleura black, the surface slightly pruinose. Halteres pale yellow. Legs with the fore coxæ dusky, the remaining coxæ testaceous yellow; trochanters yellow; femora yellow, the tips broadly brownish black; tibiæ yellow, the tips narrowly blackened; tarsi testaceous yellow, the tips of segments 1 and 2 and the terminal segments darker; legs with long conspicuous setæ. Wings with a strong brownish yellow suffusion, the base and costal region clearer yellow; stigma oval, dark brown; narrow brown seams along the cord and outer end of cell 1st M_2; veins brown, more yellowish near the wing base. Macrotrichiæ of veins of moderate length; of the cells restricted to the distal ends of cells R_2, R_3, R_4, R_5, 2d M_2, and M_3, more abundant in cell M_1. Venation (Plate 1, fig. 9): Sc relatively short, Sc_1 ending before the fork of Rs; cell M_1 longer than its petiole; cell 1st M_2 rectangular; m-cu about two-thirds its length beyond the fork of M.

Abdomen brownish black, including the genital segment. Ovipositor with the elongate valves yellowish horn color; tergal valves straight, the tips gently upcurved.

Habitat.—Formosa.

Holotype, female, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*).

Limnophila excelsa is entirely distinct from *L. platystyla* Alexander, the only other species of the subgenus *Tricholimnophila* known from Formosa. It is more closely allied to the more northern *L. pilifer* Alexander, differing especially in the smaller size, dark antennæ, more intensely black thorax, and other characters. The male, when discovered, will very probably furnish additional hypopygial differences.

LIMNOPHILA (PRIONOLABIS) ORITROPHA sp. nov.

Size relatively large (wing, male, over 10 millimeters); general coloration coal-black; halteres yellow; femora extensively blackened, especially the fore and middle femora; male hypopygium with the outer dististyle bispinous.

Male.—Length, about 9 millimeters; wing, 11.5.

Rostrum, palpi, and antennæ black; flagellar segments with the ventral face a little produced, the segments rapidly decreasing in size outwardly. Head black, very sparsely pruinose.

Pronotum black. Mesonotum polished coal-black, especially the region of the præscutal stripes. Pleura black, a little duller than the notum. Halteres yellow. Legs with the coxæ and trochanters black; fore femora black, only the extreme base pale; middle femora with about the distal half blackened; hind femora testaceous yellow, only about the distal sixth blackened; tibiæ testaceous brown, the bases and tips blackened; basitarsi brownish testaceous, the tips and remaining tarsal segments passing into black; legs with conspicuous black setæ. Wings with a strong yellow suffusion, the base and costal region even brighter in color; stigma very small, dark brown; origin of Rs, the cord and outer end of cell 1st M_2 narrowly seamed with brown; Cu and the longitudinal veins beyond the cord vaguely seamed with dusky; veins dark brown, the basal and costal veins yellow. Costal fringe and macrotrichiæ of the veins beyond the cord relatively elongate. Venation (Plate 1, fig. 10): Sc_1 ending about opposite the fork of R_{2+3+4}, Sc_2 opposite the fork of Rs; R_{2+3+4} subequal to the basal section of R_5; cell M_1 about equal to its petiole; m-cu beyond midlength of the lower face of cell 1st M_2.

Abdomen black, including the hypopygium. Male hypopygium (Plate 2, fig. 11) with the caudal margin of the ninth tergite, *t*, emarginate, thickened, and provided with microscopic spiculæ. Outer dististyle, *d*, conspicuously setiferous, terminating in a slender black spine, with a similar subterminal spine. Inner dististyle stout, terminating in a narrow, truncated, black point, before the apex with a group of small spines, the number of the latter variable, there being a group of four on one style of the type and only two on the other, as figure. Gonapophyses and ædeagus as in the subgenus.

Habitat.—Formosa.

Holotype, male Noko, altitude 8,500 feet, June 26, 1927 (*S. Issiki*).

The subgenus *Prionolabis* had not been recorded from Formosa.

ERIOCERA ISSIKII sp. nov.

Belongs to the *E. spinosa* group; antennæ (male) short; mesonotal præscutum golden-yellow with three conspicuous black stripes; legs black, the femoral bases broadly fulvous; wings brownish, the base broadly bright yellow, the apex paler yellow; abdomen black.

Male.—Length, about 18 millimeters; wing, 18; first flagellar segment of antenna, 1.4.

Rostrum dark brown, the long palpi black. Antennæ broken beyond the first flagellar segment but from this evidently short for a member of this genus; antennæ black throughout; first scapal segment tumid; first flagellar segment shorter than the second segment of the palpi, unarmed except for scattered appressed setæ. Head velvety black medially, the broad lateral margins of the vertex buffy brown; vertical tubercle weakly bifid in front.

Mesonotal præscutum golden-yellow with three conspicuous black stripes; scutal lobes black, the suture and anterior portion of the median area of the scutum black, the posterior portion more pruinose; scutellum heavily dusted with yellowish pollen; postnotum black. Pleura with the dorsopleural membrane yellowish gray pollinose; a broad stripe crossing the anepisternum and anterior portion of the pteropleurite; sternopleurite and pleurotergite densely covered with a miscroscopic yellowish gray pubescence. Halteres obscure yellow, the knobs brownish black. Legs with the coxæ black, heavily yellowish gray pruinose; trochanters obscure fulvous; remainder of legs black, the femoral bases broadly fulvous, this including about the basal third of the fore femora and about the basal half of the posterior femora. Wings with a strong brownish suffusion, the base broadly bright yellow; cells beyond the cord fading into paler yellow; stigma small, dark brown; most of the longitudinal veins further seamed with brown; veins dark brown, yellowish in the flavous costal and basal areas. Venation (Plate 1, fig. 11): R_{2+3+4} shorter than the basal section of R_5; cell M_1 present, nearly as long as its petiole; distal section of Cu_1 very short.

Abdomen, including the hypopygium, black; basal sternites a little paler.

Habitat.—Japan (Honshiu).

Holotype, male, Zyogi, near Sendai, Miyagi-ken, August 2, 1927 (*S. Issiki*).

Eriocera issikii is very distinct from all other Asiatic species of the *E. spinosa* group. I take great pleasure in naming this very distinct crane fly in honor of the collector, Prof. Syuti T. Issiki, who has added very materially to our knowledge of the Tipulidæ of Japan and Formosa.

ELEPHANTOMYIA (ELEPHANTOMYIA) LUCULENTA sp. nov.

General coloration reddish yellow; rostrum short, not exceeding one-half the length of the body in either sex; wings with a strong yellow suffusion; cell 1st M_2 large; m-cu at near midlength of the cell, longer than the distal section of Cu_1.

Male.—Length (excluding rostrum), about 6 millimeters; wing, 7.5; rostrum, about 3.

Female.—Length (excluding rostrum), about 8.5 millimeters; wing, 8.5; rostrum, about 3.2.

Rostrum dark brown, not exceeding one-half the length of the body in either sex. Antennæ with the first scapal segment ocherous; remainder of antennæ dark brown; outer flagellar segments linear with elongate verticils. Head reddish ocherous, the narrow anterior vertex and posterior orbits more whitish.

Thorax somewhat reddish yellow, the surface subnitidous. Halteres obscure yellow, the knobs a little darker. Legs with the coxæ and trochanters yellowish testaceous; remainder of legs obscure brownish yellow, the tarsi somewhat brighter in color; tibial spurs slender. Wings with a strong yellow suffusion, more intense in the costal and apical regions; veins yellowish brown. Venation (Plate 1, fig. 12): Sc_1 ending just before the fork of Rs, Sc_2 close to its tip; cell 1st M_2 very large, nearly as long as vein M_3 beyond it; m-cu at near midlength of cell 1st M_2, longer than the distal section of Cu_1.

Abdominal tergites brownish yellow, the sternites clearer yellow; hypopygium yellow; in the male with a subterminal black ring that includes segment 8. Ovipositor with the tergal valves very long and slender, nearly straight, the tip gently upcurved; sternal valves shorter and stouter.

Habitat.—Formosa.

Holotype, male, Higashinoko, altitude 7,500 feet, June 27, 1927 (*S. Issiki*).

ERIOPTERINI

GNOPHOMYIA LATEROSPINOSA sp. nov.

General coloration dark brown; antennæ relatively elongate; head dark gray; halteres yellow; wings tinged with yellow; cell 1st M_2 long, subequal to vein M_4 beyond it; male hypopygium with the outer dististyle a long slender rod that bears a conspicuous erect spine just before midlength.

Male.—Length, about 4.5 millimeters; wing, 5.2; antenna, about 1.7.

Rostrum and palpi brownish black. Antennæ (male) relatively elongate, as shown by the measurements, black throughout; flagellar segments elongate-cylindrical, clothed with a dense, erect, white pubescence. Head dark gray.

Pronotum dark brown. Anterior lateral pretergites restrictedly yellow, the posterior pretergites narrowly darkened before the suture. Mesonotal præscutum and scutum dark brown; scutellum a little more testaceous; postnotum dark brown.

Pleura dark brown, the dorsopleural region restrictedly pale. Halteres pale, the knobs light yellow. Legs with the fore coxæ dark brown, the remaining coxæ more testaceous; trochanters testaceous; femora yellowish brown with delicate dark setæ; tibiæ and tarsi passing into dark brown. Wings with a strong yellowish suffusion; stigma lacking; veins brownish yellow. Venation (Plate 1, fig. 13): Sc_1 ending about opposite R_{2+3+4}, Sc_2 some distance from its tip; Rs in alignment with R_5; r-m at the end of Rs; cell 1st M_2 relatively long, gently widened outwardly, about as long as vein M_4 beyong it; m-cu about its own length beyong the fork of M.

Abdomen brownish black, the basal sternites more yellowish. Male hypopygium (Plate 2, fig. 12) with the basistyles, *b*, short and stout, the mesal face armed with four distinct groups of stout spinous setæ, the largest of these setæ being two located on the extreme cephalic mesal portion. Outer dististyle, *d*, very long and slender, appearing as a nearly straight rod that is longer than the basistyle, a little expanded at apex, the mesal edge of which is microscopically toothed, the surface of the rod at apex with small setulæ; before midlength of the rod a conspicuous erect spine. Inner dististyle small, the apex armed with long conspicuous setæ from conspicuous raised tubercles.

Habitat.—Japan (Honshiu).

Holotype, male, Tatusawa, near Inawasiro, Fukushima-ken, altitude 2,000 feet, August 5, 1927 (*S. Issiki*).

CONOMYIA (PTILOSTENA) PALLENS sp. nov.

General coloration yellow, the præscutum and scutum marked with reddish brown; pleura striped; wings grayish yellow; petiole of cell R_3 subangularly bent near midlength and here with a distinct spur of R_2; male hypopygium with the tergal region produced caudad into two slender, feebly divergent rods.

Male.—Length, about 4.8 millimeters; wing, 5.5.

Rostrum and palpi black. Antennæ with the scapal segments light yellow, the basal flagellar segments brownish yellow, the outer flagellar segments passing into dark brown; antennæ of moderate length, if bent backward extending approximately to the wing-root; flagellar segments elongate-oval, with moderately long verticils. Head conspicuously light yellow, not at all darkened behind.

Mesonotal stripes and scutal lobes more reddish brown than in *G.* (*P.*) *sachalinensis;* scutellum somewhat obscure yellow.

Pleura and postnotal mediotergite marked as in *sachalinensis.* Legs with the tips of the femora not at all darkened, the tips of the tibiæ rather narrowly infuscated but scarcely blackened. Wings with a grayish yellow tinge, the base and costal region clearer yellow; veins brown, more luteous in the yellow areas. Venation (Plate 1, fig. 14): Sc long, Sc_1 extending about to mid-length of Rs, Sc_2 opposite the origin of Rs; petiole of cell R_3 shorter than in *sachalinensis,* subangularly bent, at the point of angulation with a distinct spur of R_2; petiole of cell M_2 short.

Abdominal tergites dark brown, the caudal margins of the segments conspicuously yellow; hypopygium yellow. Male hypopygium (Plate 2, fig. 13) with two elongate, gently divergent pale rods (only one shown in the figure) arising from what appears to be the ninth tergite, these rods conspicuously setiferous near base. Basistyle, *b,* stout basally, the outer apical angle produced into a large pale setiferous lobe. Three dististyles present, the outer, *d,* a long simple acicular rod, its tip an elongate black spine; the largest dististyle appears as a glabrous flattened blade, on the outer margin with a long slender glabrous rod that bears a large black tooth at base; innermost dististyle slender, bifid, the arms appressed, the outer arm a slender, black-tipped spine, the inner arm pale, with conspicuous setæ. Ædeagus with a conspicuous blackened bispinous head, as figured.

Habitat.—Japan (Honshiu).

Holotype, male, Sakunami, near Sendai, Miyagi-ken, August 2, 1927 (*S. Issiki*).

Gonomyia (*Ptilostena*) *pallens* is closely allied to *G.* (*P.*) *sachalinensis* Alexander, of Karafuto, which differs chiefly in details of venation. The male of the last-named species is still unknown.

GONOMYIA (LIPOPHLEPS) PTILOSTENOIDES sp. nov.

General coloration black, the thorax variegated with yellow; halteres and legs black; wings with a faint blackish suffusion; Sc_1 ending opposite the origin Rs; medial field of the wing as in the subgenus *Ptilostena;* abdomen black, the pleural membrane sulphur yellow.

Female.—Length, about 4.5 millimeters; wing, 4.8.

Rostrum and palpi black. Antennæ black, the first scapal segment pruinose; flagellar segments oval, becoming smaller outwardly; verticils relatively short. Head black, the surface sparsely pruinose; front and anterior orbits broadly buffy yellow.

Pronotum black, the anterior lateral pretergites broadly light yellow; posterior lateral pretergites very narrowly light yellow. Mesonotal præscutum chiefly plumbeous black, the lateral and humeral portions restrictedly shiny black; scutum dull black, the median area in front restrictedly pale; a small yellow spot above the wing root; scutellum broadly light yellow; postnotum black. Pleura black, the dorsopleural region yellow; a narrow, longitudinal, yellowish white stripe extending from behind the fore coxæ, crossing the dorsal portion of the sternopleurite, becoming more extensive on the metapleura and pteropleurite. Halteres black, the knobs scarcely paler. Legs black throughout. Wings with a faint blackish suffusion; veins brownish black, the basal section of M_{1+2} paler. Macrotrichiæ of veins relatively short and sparse. Venation (Plate 1, fig. 15): Sc short, Sc_1 ending opposite the origin of Rs, Sc_2 some distance from its tip; Rs gently arcuated at origin; M in alignment with M_{3+4}; cell M_2 small, much shorter than its petiole; m-cu more than its own length before the fork of M.

Abdomen black, the pleural membrane sulphur yellow. Ovipositor with the valves yellowish horn-color, the tips of the tergal valves extensively blackened; tergal valves slender, only gently upcurved.

Habitat.—Formosa.

Holotype, female, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*).

Gonomyia (*Lipophleps*) *ptilostenoides* is a very puzzling species. The venation of the radial field of the wing is as in the subgenus *Lipophleps*, but that of the medial field is as definitely that of the subgenus *Ptilostena*. Until more material is forthcoming, I am referring the fly to *Lipophleps*, where it would run by means of existing keys.

GONOMYIA (GONOMYIA) GILVIPENNIS sp. nov.

General coloration of mesonotum and scutum dark brown; scutellum light yellow; pleura pale reddish with a whitish longitudinal stripe; head gray; halteres yellow; wings with a strong yellowish suffusion; vein Sc relatively long; cell 1st M_2 closed; male hypopygium with a single dististyle; phallosome asymmetrical.

Male.—Length, about 4 to 4.2 millimeters; wing, 4.8 to 5.

Female.—Length, about 4.5 millimeters; wing, 5.2.

Rostrum obscure brownish yellow; palpi dark brown. Antennæ brownish black; the first scapal segment a trifle paler; flagellar segments oval, with a delicate white pubescence. Head gray, brighter anteriorly.

Pronotum yellow. Mesonotal præscutum dark brown, the humeral triangle and broad lateral margins yellow; scutal lobes dark brown, the median region broadly obscure yellow; scutellum light yellow; postnotum dark brown. Pleura pale reddish with a whitish longitudinal stripe across the dorsal portion of the sternopleurite; dorsopleural region pale yellow. Halteres relatively elongate, yellow. Legs with the coxæ and trochanters yellowish testaceous; femora obscure yellow at base, passing into dark brown; tibiæ and basitarsi pale brown, the terminal tarsal segments a little darker, with yellow setæ. Wings with a strong yellowish suffusion, the stigmal region vaguely darker; veins pale brown, the basal and subcostal veins somewhat more yellow. Venation (Plate 1, fig. 16): Sc relatively long, Sc_1 extending to from one-third to nearly opposite midlength of Rs, Sc_2 shortly beyond this origin; cell R_3 large; cell 1st M_2 closed; m-cu close to the fork of M, in cases a short distance beyond. In the allotype, the basal section of M_3 is only weakly preserved in both wings.

Abdominal tergites dark brown, the lateral margins and sternites more yellowish. Male hypopygium (Plate 2, fig. 14) with the basistyles, *b*, relatively slender, the outer apical angle produced caudad into a very long slender lobe that is approximately as long as the basal portion of the style; a smaller oval lobe at apex of basistyle, this provided with microscopic setulæ in addition to stouter setæ. A single dististyle, *d*, present, this appearing as a powerful chitinized blade that terminates in a slender curved spine; on the inner face of the style near base with a stout pale lobe that bears two stouter fasciculate setæ in addition to smaller normal setæ. Phallosome, *p*, consisting of a very long pale compressed blade that is irregularly bifid near apex, a long slender rod that is gently sinuous, the tip blackened, and a much smaller and slenderer needlelike spine. Ovipositor with the valves elongate, the tergal valves gently upcurved.

Habitat.—Japan (Honshiu).

Holotype, male, Tatusawa, near Inawasiro, Fukushimaken, altitude 2,000 feet, August 5, 1927 (*S. Issiki*). Allotopotype, female. Paratopotypes, 2 males.

DASYMOLOPHILUS NOKOENSIS sp. nov.

General coloration brown; antennæ short; wings pale grayish subhyaline, the cells virtually without macrotrichiæ.

Male.—Length, about 1.8 millimeters; wing, 2.8.

Female.—Length, about 2 millimeters; wing, 3.

Rostrum and palpi dark brown. Antennæ short, dark brown throughout, if bent backward extending nearly to the wing root. Head dark brown.

Mesonotum and pleura brown, with long conspicuous dark brown setæ. Halteres dark brown, only the base of the stem restrictedly pale. Legs with the coxæ and trochanters brownish testaceous; remainder of legs brownish testaceous, covered with long dark setæ. Wings pale grayish subhyaline, the very long abundant macrotrichiæ of the veins dark brown; veins pale brown, relatively inconspicuous. Macrotrichiæ of cells virtually lacking, there being a row of from eight to ten punctures in cell R_1 in alignment with R_3; in the male a few scattered punctures in the extreme outer end of cell R_3. Venation (Plate 1, fig. 17): R_{2+3} perpendicular to the end of Rs, subequal to and in alignment with R_2; basal section of R_5 and r-m lying just beyond the fork of Rs.

Abdomen brownish black, including the male hypopygium. Ovipositor with the tergal valves very powerfully constructed, compressed, strongly upcurved.

Habitat.—Formosa.

Holotype, female, Noko, altitude 9,800 feet, June 26, 1927 (*S. Issiki*). Allotopotype, a broken male, altitude 9,000 feet.

Dasymolophilus nokoensis is the first member of the genus to be described from Asia. It is distinguished from the known species of the genus by the virtual lack of macrotrichiæ in the cells of the wing. The nearest approach to this condition known hitherto is found in *D. subnudus* Alexander, of western North America, where the trichiæ are sparse in the distal cells of the wing although well distributed basad of the cord.

The relationships of *Dasymolophilus* with *Tasiocera* Skuse seem evident. The genus *Dasymolophilus* is based on the combination of venation, presence of macrotrichiæ in the distal cells of the wing, and presence of a single dististyle in the male hypopygium. Certain New Zealand species of *Molophilus* have macrotrichiæ in the distal cells of the wing, while other members of the same genus have but a single dististyle (*M. monostylus* Alexander, of Chile). Despite these points of contact there can be little question of the validity of the group.

MOLOPHILUS NIGRIPES Edwards.

Molophilus nigripes EDWARDS, Ann. & Mag. Nat. Hist. IX 8 (1921) 104.

A male specimen from the type locality (Noko, Formosa, altitude 9,800 feet, June 26, 1927, *S. Issiki*).

The specimen agrees entirely with Edward's description. The male hypopygium has not been adequately described. Male hypopygium (Plate 2, fig. 15) with the dorsal lobe of the basistyle, *b*, developed only as a low obtuse lobe; mesal lobe broadly flattened, the tip obtuse; ventral lobe appearing as a long cylindrical structure that is provided with large scattered setæ and microscopic setulæ. Outer dististyle, *d*, slenderer, appearing as a pale straight rod the tip a little expanded, blunt, provided with six or seven small denticles. Inner dististyle of approximately the same length, dilated at base, gradually narrowed to the acute tip, the outer margin before apex microscopically setulose. Ædeagus slender, a little longer than the dististyles.

MOLOPHILUS NOKONIS sp. nov.

Belongs to the *M. gracilis* group and subgroup; general coloration plumbeous black; antennæ short, black; halteres dirty yellow; wings with a brownish suffusion; vein 2d A short; male hypopygium with ventral lateral portion of the basistyle produced into a needlelike spine; inner dististyle a sinuous black rod, the apex with conspicuous spinous teeth.

Male.—Length, about 3.2 millimeters; wing, 4 to 4.2.

Female.—Length, about 3.6 millimeters; wing, 4.8.

Rostrum and palpi black. Antennæ black throughout, relatively short, if bent backward extending approximately to the wing root. Head dark gray.

General coloration of the thorax dull plumbeous black, in cases with the anterior lateral pretergites and humeral triangles restrictedly brightened; pseudosutural foveæ shiny black. Halteres dirty yellow. Legs with the coxæ and trochanters yellowish testaceous; femora obscure yellow basally, passing into dark brown; tibiæ and tarsi light brown, passing into darker brown outwardly. Wings with a brownish suffusion, the base and costal region more yellowish; veins pale brown; macrotrichiæ dark brown. Venation: R_{2+3} only gently arcuated; R_2 in alignment with r-m; petiole of cell M_3 more than twice m-cu; vein 2d A relatively short, ending just before m-cu.

Abdomen black, the hypopygium yellowish brown. Male hypopygium (Plate 2, fig. 16) with the basistyles, *b*, relatively short and stout, the dorsal lobe (not shown in figure) relatively small and stout, provided with setæ and delicate setulæ to the apex; ventromesal lobe very large, fleshy, conspicuously setiferous, a little constricted at base; ventrolateral region of the style produced into a long acicular spine, its base a little expanded. Outer dististyle, *d*, glabrous, very broadly dilated at base, soon narrowed into a flattened blade, in lateral aspect appearing to be a long acute spine; from what appears to be the basal portion of this style arises a smaller, nearly straight spine. Inner dististyle blackened, sinuous, the basal portion a little more enlarged, the apex provided with conspicuous spinous teeth, the apex acute. Ædeagus elongate. Ovipositor with the valves long and slender, the tergal valves blackened basally, the slender gently upcurved tips pale horn yellow; sternal valves long and straight.

Habitat.—Formosa.

Holotype, male, Noko, altitude 7,000 to 9,000 feet, June 26, 1927 (*S. Issiki*). Allotopotype, female, altitude 8,000 feet, June 26, 1927. Paratopotype, 2 males, with the allotype.

MOLOPHILUS ISSIKII sp. nov.

Belongs to the *Molophilus gracilis* group and subgroup; general coloration dark brownish gray; antennæ short, dark brown; halteres yellow; wings with a yellowish brown tinge; vein 2d A moderately elongate; abdomen, with hypopygium, black; male hypopygium with the dorsal lobe of the basistyle very much reduced, two ventral lobes, the outer a slender flattened spine; both dististyles acute at tips.

Male.—Length, about 4.2 millimeters; wing, 5.2.

Rostrum and palpi black. Antennæ dark brown throughout, relatively short, if bent backward scarcely attaining the wing root; flagellar segments oval with long conspicuous verticils. Head dark brownish gray.

Mesonotum dark brownish gray, clearer gray on the scutellum and postnotum; anterior lateral pretergites whitish; pseudosutural foveæ blackened. Pleura plumbeous black. Halteres yellow, the central portion of the stem a trifle darker, the elongate knobs brightening into citron yellow. Legs with the coxæ and trochanters testaceous yellow; femora dark brown, the bases obscure yellow; tibiæ and tarsi dark brown. Wings with a faint yellowish brown tinge, the base clearer yellow; veins pale brown, the abundant macrotrichiæ darker brown. Venation: R_{2+3} gently arcuated, longer than R_{4+5}; petiole of the deep cell M_3 a little more than twice m-cu; vein 2d A relatively long but nearly straight beyond the basal fourth, extending to about opposite one-fourth the length of the second section of M_{3+4}.

Abdomen, including the hypopygium, blackened. Male hypopygium (Plate 2, fig. 17) with the basistyle, *b*, unusually large; dorsal margin not produced into a lobe, appearing merely as a low yellow ridge, the margin crenulate (not shown in figure); ventromesal lobe relatively small, with comparatively few long setæ and numerous microscopic setulæ; ventrolateral region of the style produced caudad into a slender, gently sinuous flattened blade, the tip acute, the surface microscopically roughened; between these two ventral lobes of the basistyle a powerful, strongly curved, black rod; mesal lobe of basistyle larger than the ventromesal, with more delicate setæ. Outer dististyle a glabrous structure, strongly curved into an elongate spinous tip. Inner dististyle, *d*, approximately as long, less strongly curved, gradually narrowed into a long spine, the surface with rather numerous punctures. Ædeagus relatively small.

Habitat.—Formosa.

Holotype, male Noko, altitude 9,800 feet, June 26, 1927 (*S. Issiki*).

This very distinct species of *Monophilus* is named in honor of the collector, Prof. Syuti T. Issiki, distinguished student of the Mecoptera of eastern Asia.

MOLOPHILUS EDITUS sp. nov.

General coloration of mesonotum plumbeous brown, the anterior part of the præscutum castaneous; pleura testaceous yellow, especially the sternopleurite; antennæ black; halteres dark brown; wings with a brownish suffusion; vein 2d A short.

Female.—Length, about 4 millimeters; wing, 4.4 to 4.5.

Rostrum and palpi brownish black. Antennæ black throughout; flagellar segments truncate-oval to subcylindrical, with verticils that exceed the segments. Head dark plumbeous gray.

Mesonotum posteriorly pale brown, with plumbeous reflections, the præscutum in front brightening into castaneous, this including the broad lateral margins, the humeral triangles, and the cephalic portion of the sclerite. Pleura testaceous yellow, the posterior sclerites a little more plumbeous. Halteres dark brown. Legs with the coxæ yellowish testaceous;

trochanters yellow; remainder of legs passing into dark brown, the femoral bases a little paler. Wings with a brownish suffusion, the base and costal region more yellowish; veins brown, more yellowish in the flavous areas above described; macrotrichiæ rather bright brown. Venation: R_2 lying shortly proximad of the level of the basal section of R_5; m-cu oblique in position, a little less than one-half the petiole of cell M_3; vein 2d A short, ending about opposite the caudal end of m-cu.

Abdominal tergites dark brown, the sternites more yellowish brown. Ovipositor with the valves long and slender, the tergal valves gently upcurved to the acute tips, the sternal valves a trifle stouter, straight.

Habitat.—Formosa.

Holotype, female, Noko, altitude 8,000 feet, June 26, 1927 (*S. Issiki*). Paratopotype, female.

Molophilus editus is distinguished from the other Formosan species of the genus by the combination of thoracic coloration, dark antennæ and halteres, and uniformly unfumed wings.

ORMOSIA DIPLOTERGATA sp. nov.

General coloration of thorax light reddish brown, the præscutum unmarked; antennæ (male) short; halteres light yellow; legs obscure yellow, clothed with dark setæ, the outer segments brown; wings pale brown, the stigma dark brown; cell 1st M_2 open by the atrophy of the basal section of M_3; vein 2d A elongate, sinuous; male hypopygium with the gonapophyses hairy; ninth tergite appearing as two superimposed flattened plates.

Male.—Length, about 3.6 millimeters; wing, 4.5.

Rostrum and palpi dark brown. Antennæ short, dark brown, the scapal segments a little paler; flagellar segments oval with long conspicuous verticils. Head brownish gray, with long yellow setæ.

Pronotum and mesonotum light reddish brown, the anterior lateral pretergites more yellowish; posterior sclerites of the notum a little more plumbeous. Pleura slightly plumbeous. Halteres light yellow. Legs with the coxæ obscure yellow; trochanters yellow; remainder of legs obscure yellow, with dark setæ, the outer segments passing into brown. Wings with a faint brown tinge, the conspicuous stigma dark brown; veins brown. Venation (Plate 1, fig. 18): Cell M_2 open by the atrophy of the basal section of M_3; m-cu at the fork of M;

vein 2d A elongate, sinuous, the cell narrowed just before the outer end.

Abdomen brown, the hypopygium somewhat brighter, yellowish brown. Male hypopygium (Plate 2, fig. 18) with the ninth tergite appearing double, there being two depressed median plates, one lying immediately above the other. Dististyle two, the outer very small, appearing as a gently curved structure, the outer surface somewhat squamose. Inner dististyle, *d*, much larger, pale, shaped as in the figure. Gonapophyses, *g*, two on either side, the larger pair appearing as flattened hairy structures that terminate in a long black spine; second pair of apophyses appearing as a slender black spine on either side.

Habitat.—Formosa.

Holotype, male, Higashinoko, altitude 7,500 feet, June 27, 1927 (*S. Issiki*).

ILLUSTRATIONS

[Legend; *a*, ædeagus; *b*, basistyle; *d*, dististyle; *g*, gonapophysis; *i*, interbase; *p*, phallosome: R_{1+2}, $Radius_{1+2}$; *s*, 9th sternite; Sc_1, Sc_2, Subcosta; *t*, 9th tergite. Venational terminology used, Comstock-Needham-Tillyard, the radial field as modified by Alexander. Hypopygial terminology used, Crampton.]

PLATE 1

FIG. 1. *Paracladura cuneata* sp. nov., venation.
2. *Nesopeza trichopyga* sp. nov., venation.
3. *Nesopeza taiwania* Alexander, venation.
4. *Tipula sparsissima* sp. nov., venation.
5. *Tricyphona orophila* sp. nov., venation.
6. *Rhaphidolabis atripes* sp. nov., venation.
7. *Orimarga pruinosa* sp. nov., venation.
8. *Pseudolimnophila nokonis* sp. nov., venation.
9. *Limnophila* (*Tricholimnophila*) *excelsa* sp. nov., venation.
10. *Limnophila* (*Prionolabis*) *oritropha* sp. nov., venation.
11. *Eriocera issikii* sp. nov., venation.
12. *Elephantomyia luculenta* sp. nov., venation.
13. *Gnophomyia laterospinosa* sp. nov., venation.
14. *Gonomyia* (*Ptilostena*) *pallens* sp. nov., venation.
15. *Gonomyia* (*Lipophleps*) *ptilostenoides* sp. nov., venation.
16. *Gonomyia* (*Gonomyia*) *gilvipennis* sp. nov., venation.
17. *Dasymolophilus nokoensis* sp. nov., venation.
18. *Ormosia diplotergata* sp. nov., venation.

PLATE 2

FIG. 1. *Paracladura cuneata* sp. nov., male hypopygium.
2. *Nesopeza trichopyga* sp. nov., male hypopygium, lateral.
3. *Nesopeza trichopyga* sp. nov., base of antenna.
4. *Nesopeza taiwania* Alexander, base of antenna.
5. *Tipula lackschewitziana* sp. nov., male hypopygium, lateral; 5*a*, outer dististyle of male hypopygium, caudal.
6. *Tipula nokonis* sp. nov., male hypopygium, lateral.
7. *Tipula nokonis* sp. nov., ninth tergite, dorsal.
8. *Tipula sparsissima* sp. nov., male hypopygium, lateral.
9. *Tricyphona orophila* sp. nov., male hypopygium.
10. *Rhaphidolabis atripes* sp. nov., male hypopygium.
11. *Limnophila* (*Prionolabis*) *oritropha* sp. nov., male hypopygium.
12. *Gnophomyia laterospinosa* sp. nov., male hypopygium.
13. *Gonomyia* (*Ptilostena*) *pallens* sp. nov., male hypopygium.
14. *Gonomyia* (*Gonomyia*) *gilvipennis* sp. nov., male hypopygium.
15. *Molophilus nigripes* Edwards, male hypopygium.
16. *Molophilus nokonis* sp. nov., male hypopygium.
17. *Molophilus issikii* sp. nov., male hypopygium.
18. *Ormosia diplotergata* sp. nov., male hypopygium.

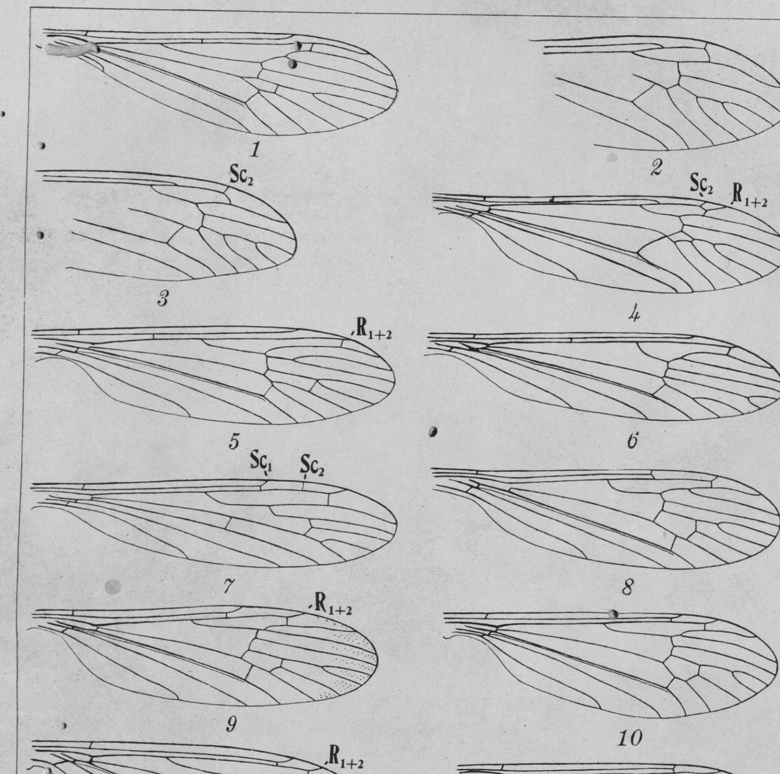
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PLATE 1.

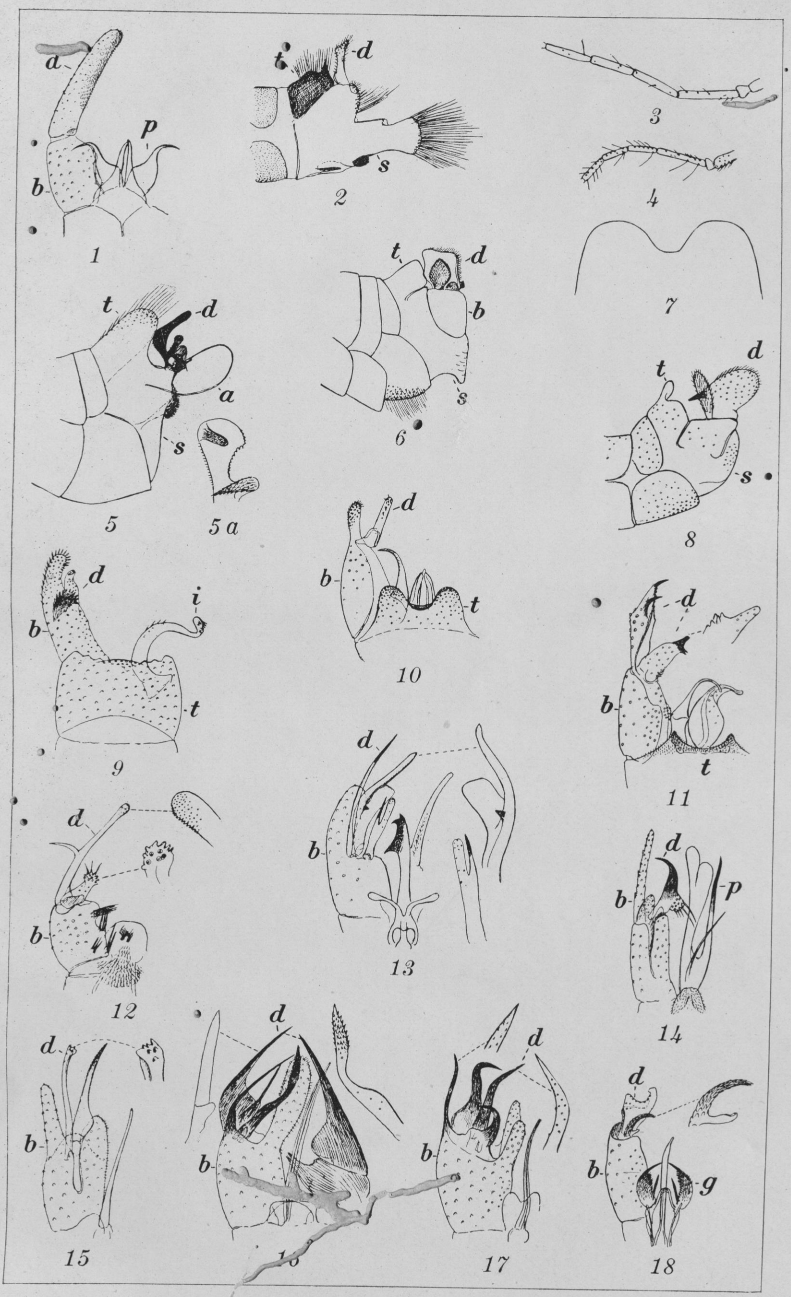
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PLATE 2.

ERRATA

Page 80, in the tenth line from the bottom, for *F. pictipes* sp. nov. read *F. picticeps* sp. nov.

Page 244, in the thirteenth and fourteenth lines from the top, for *Ehinodiscus auritus,* read *Echinodiscus auritus.*

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[New names and new combinations are printed in **boldface**.]

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